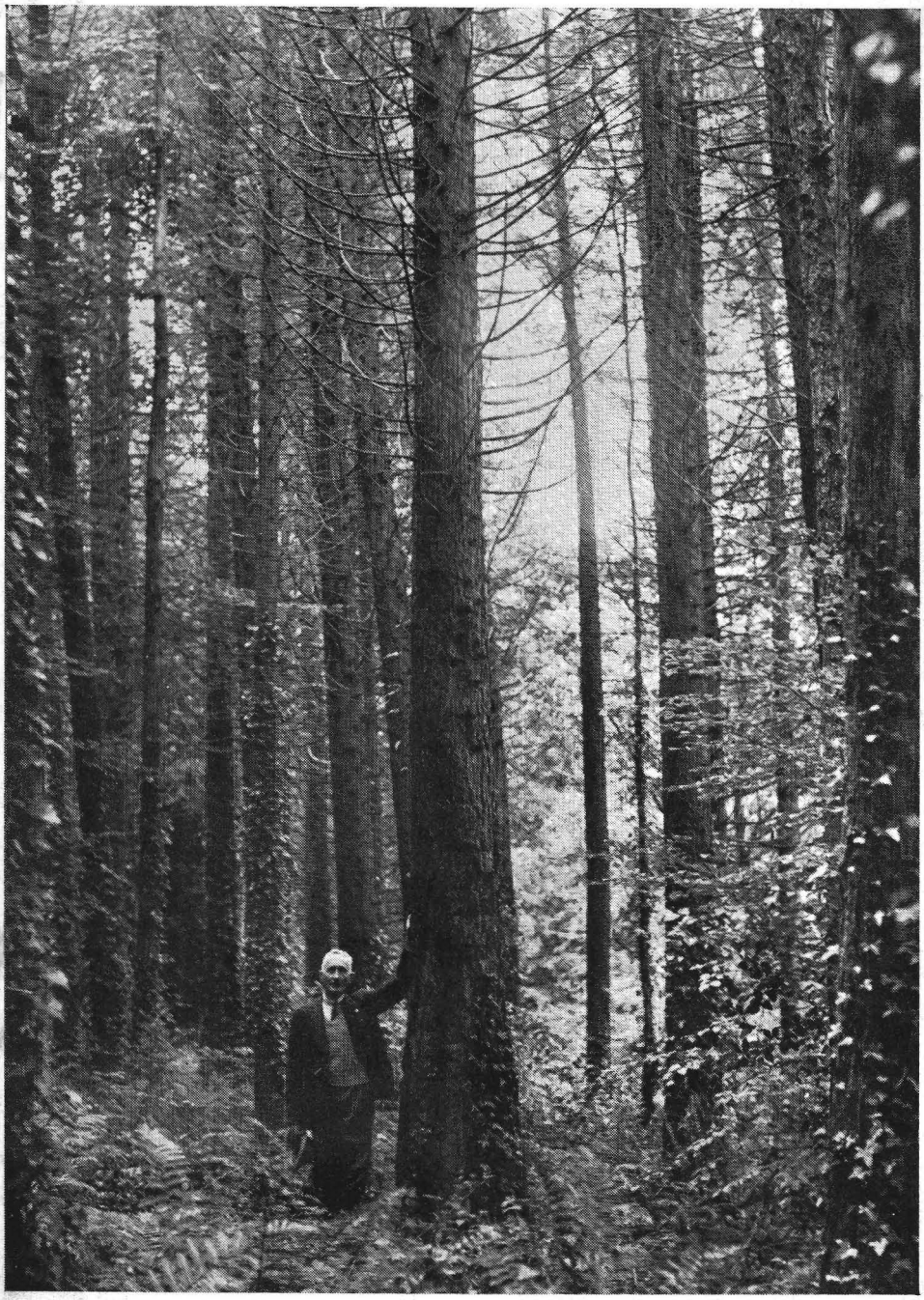
IRISH FORESTRY



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IRISH FORESTRY

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IRISH FORESTRY

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IRISH FORESTRY— TO-DAY AND TO-MORROW

By T. CLEAR, B.AGR.SC.*

The publication of the proposals in connection with the European Recovery Programme has aroused considerable comment and speculation in forestry circles in Ireland. It appears that afforestation on an unprecedented scale is planned as part of a programme of national capital development. Now the part which an afforestation programme might be made to play in this recovery programme is appreciated by only a negligible number of thinking people. To many minds forestry is dismissed vaguely as a long-term undertaking which can have no place in a programme which must be expected to reap immediate returns. It is, therefore, opportune that the potential contribution which forestry might make to the well-being of the nation should be clearly stated, so that forestry may receive a balanced and merited share of any general or national scheme for social, economic and industrial betterment envisaged by the architects of the recovery programme.

WHAT CAN FORESTRY DO FOR IRELAND?

There is little use talking about the contribution Ireland's forest resources will make to the immediate recovery of Europe. There is scarcely a country in the world so naked of trees as Ireland is to-day. The oft quoted 1% of tree-covered land is only half the picture, since that 1% is made up of skeleton woods or immature plantations. The stranger who visits our shores is shocked by the nakedness of the countryside and chilled by the untempered blast that sweeps unhindered across the shelterless plains and hills. The cry for more forests is rising in every corner of the world, but if dry statistics mean anything Ireland's needs are greater than most.

An adequate supply of wood is essential to the well-being of any nation or community of nations. Man does not live by bread alone and peoples must be housed and clothed and their crops and animals sheltered. Western Europe has reached the limit of forest devasta-

*Paper read at the Inaugural Meeting of the Bio-Chemical Society of U.C.D. on 4-3-'49.

tion beyond which she cannot go without gravely endangering her agriculture and industry and destroying her strategic timber reserves which will be so vital in times of war or economic blockade.

No country in Western Europe has any wood to spare for export, and supplies from Sweden, Finland and Russia are a poor reliance, as recent events have shown.

The chronic state of timber shortage is a threat to European stability and economic recovery, and constitutes no small factor in the political condition of Europe to-day. The lesson is plain. Every country that can spare the land and the people should seek to afforest to the utmost of its resources, especially countries where the strategic reserve is at a low limit. Ireland can make a useful contribution to European security and stability, not alone by increasing her agricultural output but by growing forest crops for its own needs, thus reducing the demand on the common pool in time of crisis and at the same time relieving the import position. Apart from any role it might play in stabilising European economy, forestry has a more particular part to play in relation to our own needs.

It would be well to try and outline at this stage the benefits likely to accrue as a result of the adoption of a large-scale forestry programme. First of all, we would be assured of supplies of an essential commodity at all times. Secondly, we should provide an avenue of employment for a considerable body of labour in a healthy rural industry. Thirdly, we should provide effective use for certain poorly productive lands; and, finally, provide an avenue for the productive employment of Government capital in the establishment, and private capital in the exploitation, of forests and dependent industries.

HOW MUCH TIMBER SHOULD WE GROW?

The question is often asked: " How much timber could we do with?" and the answer is: " An unlimited amount." What is more to the point is: " How much can we afford to grow?" We cannot afford to grow less than our reasonable requirements. It is often said that Ireland's requirements of timber are smaller than those of other countries. Admittedly we have been parsimonious in our use of timber. People use what is handiest to come by, and timber was never easy to come by here. Where forests are plentiful, timber is used and that applies even here in Ireland. I had occasion to visit a small holding in West Limerick recently and was amazed to see the wealth of timber used in outhouses. Galvanized iron was conspicuous by its absence. It appears that the owner-occupier inherited a larch wood, and he certainly made good use of it. If every holding used timber on the same scale we could do with, not one, but several million acres.

In the past our forestry programmes were designed either to meet our emergency needs or were based on the minimum requirements of timber. There are several approaches to this question as to what constitutes an adequate forest reserve. It is very difficult to deter-

mine what average rate of timber consumption is necessary to a reasonable standard of living. F.A.O. concerned itself with the question of timber consumption and reached the following conclusions: That the best tentative guide should be based on the relatively stabilised experience of pre-war Europe, i.e., about 35 cubic feet of wood per person.

The Departmental Committee of 1908 makes the following observation on this question. " The more Ireland develops industries in which wood is used, the more she raises her standard of comfort, the higher these needs will rise. . . . There is, however, one point of view from which this question may be looked at more definitely. To conduct her agriculture and her industries and to maintain the life of her people at a normal level of efficiency and comfort, a nation requires to consume a certain quantity of timber. The minimum figure is given as 10 cubic feet."

There is little use in basing probable consumption figures on countries like the United States where they use over 200 cu. ft. of timber per head every year. A country like Denmark is a better guide. Denmark is an agricultural country with a population of 4,000,000 people. It has 900,000 acres of forest, most of it planted during the period of Denmark's agricultural revival. There is now 9% of the country under forest as against our 1%. Denmark's reserve of standing timber is reckoned at 700,000,000 cu. ft., our's is 70,000,000. Denmark's forests yields 70,000,000 cu. ft. of timber each year and there is no overcutting. Our forests are yielding 10,000,000 cu. ft. per year and this represents an over cut of 7,000,000 cu. ft. The annual growth of timber per acre in Denmark, where the soil is poor and the rainfall low, is 70 cu. ft. per acre. Our poorly stocked woods and immature plantations yield only 20. On the other hand Denmark's essential import requirements for timber in 1949 are put at 250,000 standards, while Ireland's essential needs are a bare 60,000.

In 1937 Denmark produced 6,000 metric tons of pulp from her own timber and imported 82,00 metric tons. Ireland managed quite nicely on 6,000 metric tons.

These figures are quoted to show how far Ireland falls short of a similar country in both production and consumption of forest products. The startling fact emerges that Denmark, with close on 1,000,000 acres of the highest yielding forest in Europe, has still to import more than treeless Ireland imports.

Ireland's planned forest is expected eventually to yield 87.5 million cubic ft. of timber every year and doubts have been expressed as to our ability to consume this quantity. The fact that Denmark can consume 100,000,000 million cubic feet should put an end to fears on this score.

THE WASTED YEARS

The 1908 Departmental Committee on Irish Forestry recommended the planting of, at least, 1,000,000 acres over a period of 80 years. With 40 years gone what have we got? A total timber capital of 70,000,000 cubic feet, i.e., less than one year's production under Mr. MacBride's programme; less than the yield of 25,000 acres of 40-year old timber. We probably had nearer 700,000,000 cubic feet at the beginning of the present century; so much for 50 years of progress.

We have had a native government with us now for 25 years and one must admit that good steady work has been done in that time. But if the proposed programme had been put into operation in 1922, instead of 1949, what would the picture have been like?

A recent stocktaking of 1,000 acres of plantation established on poor mountain land in Co. Wicklow between the years 1922 to 1927 revealed a yield of over 1,000,000 cubic feet of measurable timber. Under the proposed planting programme, the 100,000 acres established during that 5 years would be now carrying 100,000,000 cubic feet of timber. In 5 years from now the standing volume resulting from that programme would have been 300,000,000 cubic feet. Our forestry programme would be substantially completed at about one quarter of the cost.

RATE OF FUTURE PLANTING

In a recent article in " Irish Forestry " I tried to make a case for the speeding-up of afforestation and suggested that we should aim at planting 20,000 acres a year, in view of our depleted timber reserves and because of the possibility of creating forest industries if sufficient raw material, even from the thinnings of immature woods, were forthcoming. I believe that a 20,000 or, as Mr. MacBride had now declared, a 25,000 acre programme is well within the capacity of our forestry service. The forestry units are widely scattered, and if each unit had to deal with the afforestation of 200 acres of land annually it would require only 120 working units to handle this programme. As to workers, with such a large under-employed rural population and ,especially considering the figures of emigration, it would seem strange if the necessary labour force were not forthcoming. A shortage of local labour has manifested itself in certain forest districts and it is high time that the question of housing for forest labour should be considered by the forest authority or by the local authorities. That there is a surplus of rural labour available is only too evident to anyone who has seen the crowds of migratory labourers leaving our shores every season.

COMPARISON WITH NEW ZEALAND

I was amazed, therefore, that Mr. Forbes, with his unequalled knowledge of the Irish forestry service and Irish rural conditions,

should be sceptical about the possibility of our being able to manage a 20,000-acre programme. Mr. Forbes states in the current issue of *Irish Forestry*: " When, however, Mr. Clear advocates the annual planting programme being increased to 20,000 acres, and to land being acquired worth £10 per acre or so, one is tempted to question whether all the implications involved have been considered." In discussing the implications, Mr. Forbes draws the attention of his readers to the paper by a Mr. F. W. Foster of the New Zealand State Forest Service on " Exotic Forests of New Zealand." This paper is quoted to show that orthodoxy in forestry is fundamental to success and that any departure from the 6,000 or so acres done each year is likely to be fraught with serious economic and administrative consequences.

I have gone to the trouble, at short notice, of obtainng Mr. Foster's paper and also of getting information on New Zealand's forestry position. First I found that, far from being a country scraping the barrel of its last few timbered acres, as is the case here, New Zealand had a forest of 17 million acres, of which 5 million are exploitable, i.e., mature and easy to fell. Of this, nearly 2 million is of valuable softwoods, such as Rimu, Kauri, Totara, suitable for building, joinery and boxwood, carrying 2,000 million cubic feet ready to fell and as much more in less accessible forests. And this country, with a forest area greater than the total area of our 26 Counties, with 26,360 square miles of forest (to give the recorded figure), is compared with Ireland with its 300 square miles of immature plantations. And now here is the rub! In 1925 the newly-formed forest service enunciated a policy of controlled, almost rationed, use of the remaining 18 million acres of indigenous forest, accompanied by an afforestation programme on cleared or treeless land with a target of 300,000 acres in 10 years. They finished the programme in 5 years, planting 307,000 acres by 1930. By 1936 a further 118,000 acres were added. Side by side with this state effort, private companies promoting afforestation schemes were backed by the people, subscribing £25 per acre, to the tune of £8,000,000 and planted over 300,000 acres of pine forest.

Thus we have a small nation of 1½ million people, with vast reserves of virgin forest, spending millions, directly in bonds and indirectly in taxation, to fight the threat of timber famine said to be looming directly ahead. They planted 800,000 acres far from settlements and labour and now they complain of difficulties. " If it be possible," says Mr. Wilson, " to reduce the mistakes to a simple formula, it is that of maldistribution of age classes combined with lack of silvicultural tending." In other words, it was a mistake to plant 700,000 in 10 years in places where there were no people to look after those planted acres. And now, to cap it all, the current policy announced in 1946 aims at planting a further 270,000 acres.

I must confess to a feeling of bewilderment. The moral I have drawn from my adventure into the ways of antipodean forestry is that we in Ireland are mere children when it comes to dealing with matters such as this. We play with miniatures when other peoples will not have less than full-size working models. Another thing that struck me was the way the people of New Zealand subscribed so freely to afforestation, this in spite of official propaganda against the idea. Would the patriotic Irish subscribe as freely to a loan floated for this purpose? It should be as safe as Burma teak, Malayan rubber or Iranian oil.

THE COST OF FOREST LAND

The wisdom of allowing the forest authority to spend up to £10 per acre on the purchase of forest land has also been questioned. Now the main bottleneck in the development of the desired forestry programme at present is the lack of suitable land. The land is there and if the Government is really serious about afforestation, if the programmes appearing in White Paper and public Press are ever to get beyond the paper stage, this question of land acquisition will have to be squarely faced. The price of land in Ireland has soared in recent years, and land that was readily available in the 1930's at £2 or £3 per acre is difficult to get at 3 times that figure now. At the present value of the £ no land of any use can be got at £4 per acre. Store cattle and sheep are fetching at least 4 times what they fetched in 1938 and all the forester can hope to buy with his allowance of £3 or £4 is rock or mountain top.

LACK OF CO-ORDINATED LAND USE POLICY

The time is over-ripe for a constructive land use policy, otherwise we will have wholesale waste of money and effort. The danger, as I see it, is that to fulfil the programmes allotted to them the agriculturist will reclaim land that will never be anything but marginal for agriculture and the forester will have to confine himself to land that will never be anything but marginal for forestry. If this is likely to happen we would be far better without big programmes of land reclamation and afforestation. Due to the absence of a constructive land use policy over the past 50 years, large acreages very suitable for afforestation and which are entirely non-arable and of little grazing value have been carved up and parcelled out among a multitude of smallholders.

The State has been even more irresponsible than the displaced landlords in its attitude to marginal land. Instead of retaining control over such land so as to ensure that its productivity would be maintained or improved, it was passed on, very often, to those least able to reclaim or improve it.

This policy of division of marginal land, which has been excused on the grounds of necessity and political coercion, has resulted in a

situation where most land suitable for forestry is held by small farmers and can only be acquired after tedious and expensive negotiations.

It is now extremely difficult to develop an orderly scheme of afforestation and land improvement. The result of this lack of policy can be seen in many mountainy areas to-day, where large numbers of half-starved and pest-ridden stock range over a wide and growing area of uncultivated land, which ought, under a proper system of management, to be producing several times as much in various forms of produce.

There is ample room for the forester and the farmer on these waste lands, which cover more than one-third of the total area of the country.

The decline of our mountainy population can be largely attributed to the spread of sheep grazing. Sheep gradually ousted the old system of intensive farming which had maintained a fairly high standard of fertility by the tillage and top-dressing of the enclosed field. The general effect of hill sheep-farming has been the gradual change in the vegetation of the hills, the steady abandonment of once reclaimed land to bracken, furze and heather. If one could rely on the opinion of local people, the stock-carrying capacity of hill land was at one time fairly high. Farmers will point to bracken or furze-covered hills and say they remember that place being one of the best grazing hills in the country. Since the end of the last century, however, the sheep population has been falling and is now about 1½ million less than in 1890. In the same period the area abandoned to rough pasture is in the region of 1½ million acres.

Now the question arises, should this abandoned land be reclaimed for farming or should portion of it be devoted to forestry. In Counties Wicklow, Wexford, Waterford, Tipperary and Cork, above the agrarian zone with its fenced and improved land, its shelter belts and farm buildings, lies a belt of marginal land called, by agronomists, the " hill pasture zone." This zone passes into the moorland zone at higher levels. It is because of the extensive occurrence of the hill pasture zone that the south-east and southern uplands are particularly sought after by the forester. If blocks of this type of marginal land, which is the type of land which has been progressively abandoned to rough-grazing and which has a low stock carrying capacity due to the poor quality vegetation, could be purchased for forestry, portion of the higher moorlands could be economically afforested as well where exposure was not too severe. If the forester is compelled to accept an ever-increasing proportion of moorland with its thin gravelly panbound soils or its waterlogged peat blanket, forestry will be a failure in this country. The crop yields estimated in the recovery programme can only be expected if the proportion of hill pasture to moorland afforested is in the ratio of, say, 70 per cent. to 30.

A survey of hill grazings in Scotland carried out in recent years by agricultural experts revealed that only 0.5 per cent. of the 10 million acres of rough grazing there was considered capable of being made arable. It was further estimated that only 2.5 per cent. of the total could be turned into reasonable permanent grass.

We hear of schemes to reclaim, for agriculture, vast acreages of land in this country, but these returns from Scotland would indicate that we must look elsewhere than to mountain land. The improvements required by our arable 11,000,000 acres is sufficient to employ an army of men with drainage equipment, fertilizer spreaders and bulldozers.

If anyone wishes to know what type of land the forester has in mind let him take a run out through Rathfarnham, up by the Hell Fire Club and out over the Featherbed mountain into Glencree. Reckon out of the question the devastated lands left by the turf men from Rathmines and the land thereabouts, but look down into Glenasmole and into Glencree. What scope is there for an afforestation scheme! Ask the workers in Glencree what they would have done after the turf-cutting closed down if the plantations at Crone and Ballyreagh were not there to receive them.

FORESTRY AND RURAL DEPOPULATION

Yes, apart from the direct yield from timbered land, there would be other important benefits of the proposed large programme of afforestation. The influence of properly sited forests goes far beyond the commodity value of their produce—great as that is. The drift of population from the land has been most severe in the areas coming within the scope of afforestation. This has long been a political problem and one that is still with us. The system of land use in mountain areas has failed to hold the former populations in the remoter parts of the country and no amount of rural electrification will hold them unless an industry is created which will absorb a growing number of people and provide openings for the ambitious as well as the unskilled labourer. No form of development in mountain areas promises to bring back as much life to the glens as forestry. There is ample room for the forester and the farmer on these waste lands which cover more than one-third of the total area of the country. The requirements of the farmer can be met by the forester: their work is complementary. The forester, by providing regular employment, especially in winter and spring when there is little doing on upland farms, will help the farmers, who need not be constrained to carry a quota of under-employed workers in order to have sufficient for rush periods.

Given a fair proportion of the hill pasture zone, the forester can employ 1 man to 50 acres in the woods and 3 to 4 times that number when the felling and conversion comes due. When the full 1,000,000 acres, which represent the ultimate object of the present programme, are in production, it is estimated that there will be from

10,000 to 15,000 men in the forests and 50,000 men in the auxiliary industries.

This increased rural population would help production of food considerably, the workers being part-time in the forest and part-time on their holdings. Pigs, chickens, cattle, vegetables and fruit would replace or supplement the ubiquitous sheep. Vermin would be kept under control, land would be better manured because of the greater number of housed and enclosed stock, better tilled because of the greater manpower available, better sheltered and watered because of the neighbouring forests.

Forests provide farmers with income which in some cases enables them to subsist on otherwise submarginal farms. At the same time, the presence of nearby farms, providing a local source of man-power, horse-power and food, facilitates the operation of forest industries. Both forestry and farming supplement each other if they are properly co-ordinated.

Above all, crops should be suited to the land. Scientific methods of land classification can indicate soils best suited to tillage, grazing or forests, respectively. Our Government could benefit from a review of its land utilization in the light of this knowledge.

Before concluding this review I would like to deal with one or two important matters affecting the welfare of the forestry programme.

A THOUGHT FOR THE FORESTER

The successful carrying through of the forestry programme will, to a great extent, depend on the men who plant and supervise the work. The business of forestry, and its background of science and research, necessitates specialised training for all who wish to make the planting and management of woods their life's work. Forestry, as a profession, calls for a considerable breadth of technical and general knowledge. Foresters are husbandmen, business men and, to a certain extent, scientists too. They must have the benefit of research and keep pace with the growing fund of knowledge regarding their subject if they are to remain efficient. If a forester is to do his job he must be serviced with the right tools, the right education and above all receive sufficient remuneration to enable him to keep his mind on his job. He should be able to afford the profitable enjoyment of association with his colleagues in a professional society. A forester has little chance of meeting and conversing with his colleagues. He is hungry for an exchange of views, eager for a chance to see how the other fellow does his job so that he may learn to do better. I know all this from my association with Irish foresters. They only ask the assurance of a modest competence. They know the life in the forest is a good life,, with many compensations. But what of the forester's wife and children away from social contacts, from schools and shops? A forester should have fair wages in keeping

with his skill and responsibility. His wife and children should have good accommodation, and he should be able to look forward to a pension after a life of strenuous, national service. If forestry cannot afford him that, we are as well rid of it.

EQUIPMENT

The forester should have the tools to do the job required of him. These tools! Look over the seas to Great Britain and see what is going on. Research in soils, in the technique of afforestation, in the nursery, in the timber laboratories. We look with envious eyes at their facilities for instruction, the equipment of their offices and laboratories, their mechanised forests and nurseries.

For ages our politicians have looked to the forester to deal with the waste land of the west, that repository of the last surviving outpost of Gaelic culture. In Britain they have tackled a like problem; and on the moorlands of Wales and Scotland, armed with new knowledge and modern equipment, special ploughs and giant crawler tractors, the foresters are fighting a winning battle on areas previously regarded as unplantable.

RESEARCH

It is high time also that we had a forest research organisation of our own, to give us first-hand information on our purely local problems. There is a belief that forestry in Ireland cannot afford to spend money on research. It is a poor ship that cannot afford a pilot and a doomed ship that tries to brave the unknown seas without one.

AN INSURANCE POLICY

Finally I would like to sell the following idea to the present government and I think the occasion is most propitious.

Would it not be a very appropriate gesture to take out an insurance policy on the newborn Republic of Ireland in the shape of planted acres? Why should our Government have less faith in the future of this State than the father of a newborn child. We are admnoished from every hoarding to save for the future. If we pay a yearly premium now of £1,000,000 or so in afforestation, we can guarantee for a large portion of the rising generation, when the policy matures, a higher standard of living, more work in field and factory; for all a healthier and more beautiful countryside.

The money we spend will not go out of the country, but into the pockets of our most needy and depressed classes, the mountainy farmer and the rural worker. These will, in turn, spend their earnings in the shops of our rural towns and villages, buying the produce of our fields and factories. Every pound spent now will bear fruit, in season, a hundredfold.

The Possibility of Afforesting Soils of the Old Red Sandstone in Ireland*

By WALTER WITTICH.

The soils of the Old Red Sandstone formation of the Devonian period are widely distributed in the south and south-west of Ireland. As they are, practically speaking, unproductive, their afforestation has been under consideration for many years. It is an open question whether it could be carried out by means which would be economically justified or whether it would be possible at all. After many unsuccessful experiments it seems generally agreed that the soils in their present state are quite unsuited for afforestation and that some fundamental improvement would be necessary. What form this improvement should take is disputed. In my opinion, success is conditional on an accurate knowledge of the character of the area and of the nature of the " soil sickness ". Only when one has a clear knowledge of the physical, chemical and biological peculiarities of the soils can one hope to discover the measures adapted to the area and to avoid costly mistakes. These suggestions aim at making some small contribution to the problem. Thanks to the kindness of the Director of the Forest Service, Mr. Reinhardt, I was able to study soils of the Old Red Sandstone formation in various parts of Ireland. The places where afforestation had already been attempted were particularly interesting. It was possible here to trace the connection between the development of different species and the soil properties and thus to come nearer to the causes of failure. A particularly suitable example of this sort is found on the Ballyhoura Hills in the south of Ireland, and the following study is concerned with this example. The shortness of my visit forced me to confine myself to a study of superficial soil conditions. I took and studied more closely samples from one typical profile.

The afforested area lies on a gentle southern slope of the Ballyhoura Hills. The parent material of the soil is a diluvial glacial debris, consisting of material of Old Red Sandstone, laid down as a thick layer on the unweathered rock of the same formation. Afforestation was carried out over a large area during the years 1910-15† and experiments with different kinds of soil treatment were carried out at the same time. *Pinus sylvestris* was the main species planted; apart from a few weakly plants it has disappeared. Oddly enough, *Pinus contorta* shows better growth although there is no difference in soil conditions. Unlike the Old Red Sandstone formation in England, which is, for the most part, of maritime origin and rich in minerals, the formation in Ireland is an inland lake deposit, consisting mainly of quartz and containing few bases and little weatherable material. There is, in particular, a great deficiency of

* Translated from " Intersylva," No. 3, 1942, and published by kind permission of the author and of the editors of " Interslyva."—Editor.

†This should read " 1924-28."—Editor.

lime. Vegetation adapted to these conditions is naturally equally deficient in bases, so that the decomposition of dead plant material, in the damp Irish climate with its cool summers, took an unfavourable course from the first. The result was the formation of a thick humus or peat bed, which must be several decimetres in depth, and which, as " mountain or heath peat ", covers vast areas of the Irish mountains. In the afforested area the peat had been used as fuel for many years and to-day the bare soil is visible.

Under the influence of the acid peat layer and the humid climate, podzolization was bound to make rapid progress in this poorly-buffered material. The result is that to-day we find an extreme example of the podzol profile. The leached horizon (A) consists of slightly loamy sand and reaches to a depth of about 25 cm. Sample No. 1 was taken from here. The next, severely compacted horizon (A/B), reaches an average depth of 40 cm., in many places even deeper (Sample 2); it is, as one can see from its superficial appearance, much richer in the finer articles. This is clearly due to the fact that the particles leached from above are mechanically prevented from further downward penetration by the underlying iron hard-pan (Sample No. 3), and thus accumulate above it. The hard-pan, 7-10 cm. thick, is unusually compact. It has the effect of armour plate, completely shutting off the upper horizons from the subsoil. Sample No. 4 was taken from a depth of 90 cm. It is true that this horizon (B/C) shows clearly influences from the upper horizons, but as a result of the sealing-off by the hardpan, such influences are very restricted, so that in many respects this horizon is similar to the unweathered parent material and can for some purposes be regarded as identical with it.

TABLE 1. PARTICLE SIZE, MINIMUM WATER CAPACITY AND pH

No	Horizon	Particle size of the fine soil				Minimum water capacity p.c.	pH	
		2-0.2 p.c. "Coarse Sand"	0.2-0.02 p.c. "Fine Sand"	0.02-0.002 p.c. "Silt"	Less than 0.002mm p.c. "Clay"		KC1	H2O
1	A	32.94	56.56	8.24	2.26	10.6	3.4	3.9
2	A/B	32.30	44.49	13.20	10.01	16.7	3.9	5.1
3	B (Ironpan)	24.84	55.21	12.75	7.20	13.7	3.9	5.3
4	B/C	28.03	46.15	11.62	14.20	14.6	3.9	5.3

Table 1 shows the composition by particle size of the fine soil, i.e., of the fractions under 2 mm. in size. The soil contains a considerable amount of coarser material, and of fair-sized stones. The

results of the mechanical analysis confirmed what one could see clearly enough with the naked eye, the poverty of the A horizon in raw clay and, to a lesser extent, in silt. This is not solely a question of a mechanical displacement, but, as we shall see later, also of the " sol " type of leaching of clay decomposition products, under the influence of humic acids. The mechanically transported particles of clay and silt have accumulated above the hardpan, filling up the spaces, while the highly hydrated organic colloids, brought down by leaching at the same time, have destroyed the cohesion between the mineral particles and led to extreme compaction. The minimum water capacity is, as shown by the last column but one of Table 1, much higher in this horizon, as a result of the accumulation of clay particles, than in horizon A. Practically speaking, this is of no great importance, since the movement of water is determined rather by the impermeability of horizon B.

Research on the biological condition of the soil was not possible, because the samples dried out too much during transport. There can be no doubt, however, that it is unfavourable in every respect. The hydrogen-ion concentration is high (Table 1). All the samples lacked nitrate. Apart from small quantities of ammonia, the nitrogen occurred in a bound form in organic compounds. To make it available to plants, it would be necessary to increase the biological activity of the soil, and, as an essential condition for this, to effect a thorough-going reduction in soil acidity.

TABLE 2. CHEMICAL COMPOSITION

No	Horizon and depth in metres	CaO p.c.	MgO p.c.	K2O p.c.	Na2O p.c.	P2O5 p.c.	Fe2O3 p.c.	Al2O3 p.c.	SiO2 p.c.	N p.c.
	Ballyhoura Hills									
1	A	—	0.03	0.05	0.04	0.008	0.05	0.17	0.71	0.04
2	A/B	0.005	0.09	0.16	0.08	0.01	0.21	1.46	1.74	0.03
3	B(Ortstein)	—	0.12	0.13	0.07	0.02	2.45	1.28	1.79	0.02
4	B/C	0.004	0.09	0.19	0.09	0.02	1.39	1.49	1.80	0.01
	Eberswalde subdistrict 20									
5	1 m	0.03	0.04	0.03	0.04	0.01				
6	2 m	0.05	0.01	0.02	0.06	0.01				
7	3 m	0.03	0.04	0.02	0.04	0.01				
	Carzig subdistrict 140									
8	1 m	0.08	0.04	0.04	0.11	0.03				
9	2 m	0.50	0.02	0.04	0.10	0.03				
10	3 m	0.54	0.02	0.04	0.10	0.04				

Table 2 shows the results of chemical analysis (extraction with concentrated hydrochloric acid). In comparison with the B/C horizon (No. 4), we find that the A horizon is very poor in all nutrients. Calcium, magnesium, potassium and sodium are present in the next horizon in approximately the same amounts as in the subsoil; this horizon is deficient in iron, and, to a less extent, in phosphorus. The hardpan has naturally a higher content of iron, but in respect of the other nutrients differs very little from the subsoil.

In order to appraise the nutrient status of the Irish soils, we shall compare them with two typical diluvial sands from Brandenburg. The first (Subdistrict 20, Eberswalde forest) belongs low down in the 3rd; the second (Subdistr. 140, Carzig forest) in the 2nd quality class. The Eberswalde soil has, in a fine sand content of 65 per cent., 97 per cent. quartz. The soil is, indeed, slightly podzolized, but there is no question of any pan formation in the B horizon sufficient to affect the growth of the roots to the slightest extent. Compared with this soil, the Irish soil is decidedly deficient in calcium; on the other hand, it is richer in potassium and magnesium. In the B/C horizon, we find 1/10 of the calcium of the Eberswalde soil but eight times the potassium, three times the magnesium and twice the sodium and phosphorus. Taking Ca, Mg and K together, the Irish soil is three times as rich in these important bases as that of Eberswalde. Compared with the fertile Carzig sand, the Irish soil has four times the potassium and three times the magnesium content. On the other hand, the Carzig soil is somewhat richer in phosphorous, and much richer in calcium.

When one considers that the relatively poor Eberswalde area gives satisfactory forest yields, it is evidently necessary to revise the usual assumption that only the low nutrient content of the Old Red Sandstone prevents the cultivation of trees. This is confirmed by the fact that, where the lower horizons have been exposed, as in the gullies (to be discussed later), caused by sudden strong erosion, the few Pines, which have come in by chance, have developed normally although conditions in this raw soil are unfavourable in themselves. It is not that the parent rock is too poor in plant foods, but that it is too poor, in the climatic conditions prevailing there, to offer sufficient resistance to extreme podzolization. In Brandenburg, where the climate is of a continental character and there is half the rainfall, the continual splitting off of bases from the Old Red Sandstone would have been enough to counteract severe soil degradation. A slightly podzolized soil, providing, nevertheless, quite adequate conditions for plant growth, would have developed. With a slightly higher calcium content, we might have expected the development of a brown forest soil, as in the case of the second of the soils used for comparison. Here the continual supply of bases split off from the silicates is sufficient to prevent the breakdown of clay and the displacement of the products of decomposition, instead of which a

de novo formation of clay substance occurs. As weathering acts most strongly at the surface, we find that the proportion of clay decreases with depth. The content of silt and clay is four times as great in the A horizon as in the lower part of the B horizon. In the Irish soil, the distribution is reversed. In the extremely damp climate of Ireland, with its mild winters and cool summers, severe decomposition of the clay and a sol type of leaching of the decomposition products into the subsoil occurs. This is clearly shown by the distribution of the inorganic colloids in the soil, quantitively determined by Tamm's method—extraction with ammonium oxalate (Table 3).

TABLE 3. INORGANIC COLLOIDS

No.	Horizon	SiO_2 p.c.	Fe_2O_3 p.c.	Al_2O_3
1	A	0.47	—	0.13
2	A/B	1.71	—	0.29
3	B	2.96	0.72	0.30
4	B/C	3.45	0.12	0.17

In the A horizon we find an abnormally low colloid content. All the colloidal iron has been leached out. Not even a trace is left. It is still missing in the horizon immediately above the hardpan, but has accumulated heavily in the latter. An important fact in the development of the soil condition is that the iron has been precipiated in a comparatively narrow horizon, causing the formation of the compact hardpan, which has intercepted the particles washed down and become a serious obstacle to drainage of water. The aluminium hydroxide colloids have been leached only from the A horizon, and there only in part. They accumulated not only in the hardpan but in the horizon above (No. 2), which is in this case a horizon of accumulation, but, in the case of iron, one of extreme leaching. The distribution of colloidal silicic acid is again quite different. It increases evenly with depth, and the greatest quantity is found below the hardpan (No. 4). This B/C horizon must, therefore, be considered as a horizon of accumulation for silicic acid. Obviously the hardpan is no obstacle to the colloidal silicic acid, which, as an electro-negative sol, can pass even through fine capillaries. It is present in considerably larger quantities than the iron and aluminium colloids in all horizons.

To sumarise, we can establish that the soil has suffered unusually severe destructive processes. The A horizon has almost entirely lost its active sorption complexes, while in the Carzig sand taken for comparison, the upper horizon is particularly rich in both organic and inorganic sorption complexes. The poverty of the Irish soils in sorption complexes is shown by the quantity of exchangeable ions available in the different horizons, which can be determined either

by exchange with salts, or, as in the present case, by ultra-filtration. Only magnesium, which does not pass through the collodion filter, had to be determined by exchange with ammonium chloride. Besides the ions that are held by the sorption complexes proper, others from the crystal lattice are also exchanged. However, it is only in the subsoil that these play an important part in comparison with the first group. Table 4 shows the results. We see that the lowest horizon has considerably more exchangeable bases than the impoverished topsoil. In a healthy soil the position is reversed. It is also noticeable that the alkalis considerably preponderate over the calcium, while, generally, as in the case of the soils taken for comparison, the calcium ions greatly exceed the alkali ions. The amount of exchangeable magnesium cannot be directly compared with the bases of the ultrafiltrate, because the methods are not comparable. Its values are, however, unusually high—about 10 times those obtained by the same method from the diluvial sands already mentioned. The pronounced calcium deficiency and the relative richness in Mg and K, as shown by the chemical analysis, are thus reflected in the ions held by the sorption complexes. The phosphoric acid is probably present in the form of iron and aluminium phosphates. There were hardly any phosphate ions present in the ultrafiltrate.

TABLE 4. RESULTS OF THE ULTRAFILTRATION

Minutes	Ultrafiltration						Exchange with NH4Cl
	Anions	Cations	Ca	K+Na	NH3	P2O5	mg
	m.e.	m.e.	m.e.	m.e.	m.e.	m.e.	m.e.
			A Horizon				
0—20	0.192	0.168	0.039	0.077	0.04	0.010	
20—50	0.060	0.044	0.020	0.016	—	0.006	
0—50	0.252	0.212	0.059	0.093	0.04	0.016	0.165
			B/C Horizon				
0—20	0.134	0.472	0.063	0.195	0.05	—	
20—50	0.035	0.050	0.029	0.010	—	—	
0—50	0.169	0.522	0.092	0.205	0.05	—	0.200

m.e.: milli equivalent

The nutrition conditions apparent from an investigation of the distribution of the sorption complexes and the nature and quantity of the ions held, a knowledge of which is important for the determination of the remedial measures to be taken, are very unfavourable. By themselves, however, they cannot account for so complete a failure of the Pine plantations. The physical characteristics of these degraded soils are far more decisive. We remember that the silt and raw clay particles washed down from above, accumulated

above the hardpan. As a result of poverty in electrolytes and the effect of the acid humus materials, there is no cohesion between these particles. Each time the soil becomes waterlogged it takes on a pasty consistency in which the newly-formed pores disappear again. The soil " flows together ", thus becoming extremely compact. Cultivation is useless, unless the fundamental evil is removed; the artificial structure of the soil thus obtained disappears again at the first heavy rain. This compacted layer itself becomes relatively impermeable and increases the sealing effect of the hardpan. The result is periodic waterlogging after heavy rainfall. On the slopes, an unusual and characteristic phenomenon occurs. During the frequent torrential rainstorms common in Ireland, the water which is unable to penetrate into the soil flows downhill with such force that, under certain topographical conditions, erosion gullies are formed in some places. The water rushes into them from all sides, and runs through them with such violence that it can even erode away the armour plate of the hardpan. When this obstacle is removed, the water rapidly scoops the bed down to a considerable depth. The afforestation area on the Ballyhoura Hills is thus crossed by many erosion gullies, which are said to cut their way one metre deep into the soil within a few days and are deepened to 3 metres by later downpours of rain. In the Old Red Sandstone area of Clonmel, I even found an erosion trench which was 8 metres deep. These erosion phenomena occur only where the peat has been cut for use.

The severe compaction of the soil and the periodical waterlogging cause the Pines to develop unusually shallow roots. Even plants which have survived so far confine their rooting to the upper 5-10 cm. It is understandable that plants confined to this shallow layer, exposed to all the changes of weather, grow weakly and finally die. It is noteworthy that the roots of *Pinus contorta,* the species that shows satisfactory growth in these conditions, penetrate deeper and sometimes even reach down to the hardpan. It is known that the common Pine is particularly sensitive to oxygen deficiency, while other species stand it better. *P. contorta* appears to be one of these species. According to investigations by Forbes, *P. montana* and, in some areas. *P. laricio* also show satisfactory growth in such conditions.

Once we are clear about the nature of the " soil sickness ", it is not difficult, at least theoretically, to suggest measures for its cure. First and foremost, the soil must regain its permeability to water, and be opened up for the passage of roots through to the subsoil. For this the hardpan must be removed, and a normal structure restored to the horizon above it. The latter can be done by mixing together the soil from the eluvial and illuvial horizons, so providing for the reconstitution of base-saturated sorption complexes, as has been done with strongly podzolized soils in Denmark, and more recently in Holland and N.W. Germany. The material, rich in col-

loids, of the B horizon is mixed by ploughing with that of the A horizon. This is followed by heavy dressing with mineral fertilizers, above all with lime, so that base-saturated sorption complexes are formed. This lime dressing at the same time brings about an improvement in the biological conditions of the soil, and an activation of the humus. By this means the soil regains normal physical and chemical properties, particularly structure, permeability to water, and base-exchange capacity. At the same time, through the removal of the hardpan, the lower soil layers are made available for root growth. In this way it was found possible in Denmark to bring back into a high level of productivity extremely podzolized soils, which had resisted all attempts at afforestation. Theoretically, it would be possible to do the same with the soils of the Ballyhoura Hills, but not in practice. The technical difficulties are too great In general, the hardpan lies too deep to be broken up by the plough. Moreover, the large number of stones would make mechanical cultivation difficult. It would, on the other hand, be pointless to use methods of cultivation which did not remove the fundamental evil. Just to break through the hardpan would not be enough, because it would soon form into a hard layer again.

A second possibility is to abandon the idea of opening the lower horizons to the roots, and instead to bring about optimum conditions in the layers above the hardpan. This seems feasible where the thick peat has not been removed and the hardpan lies very deep. The peat consists largely of lignin and lignin fractions, which are released by the breakdown of the readily-decomposed associated carbohydrates. After liming, they undergo strong autoxidation. This forms acid groups, of great importance to the soil's sorption capacity; and, through polymerisation, combination into valuable true humus material is effected. A necessary condition is that nitrogen should be added to the soil in quantity, in order that during this polymerisation it may be incorporated into the newly-formed humus molecule in the form of " nuclear " nitrogen. Even in an atmosphere of strong biological activity, these true humus materials are extremely resistant to bacterial attack, especially when they are linked to clay particles. Clay of the montmorillonite type contained in many kinds of marl is particularly valuable. With this very active clay substance, an admixture of only about 2 per cent. is enough to produce effective linkage, and thus a high degree of stability in the humus. These newly-formed true humus materials possess a great sorption capacity, have a favourable physical effect and, after application of mineral fertilizers, can create excellent conditions for plant growth. Where this converted peat is mixed with the mineral soil by cultivation, the structure of the latter is also improved. Its capacity for absorbing water is increased so much that quite heavy rainfall can be absorbed without waterlogging. In spite of the limited rooting space, a fertile soil can be created in this way. For the time being such improvement may, perhaps, seem too expensive

for forest use; it is, however, worth considering even to-day for conversion of land to agricultural use.

On the Old Red Sandstone in the neighbourhood of Clonmel, I found, besides the deep erosion gullies already mentioned, slight sheet erosion of the upper soil layers on rather steeply sloping ground. The presence here of tree stumps, in contrast with neighbouring areas where this erosion was not present and the profile was the typical one already described, showed that a stand must have existed there; and judging from the size of the stumps it cannot, at least, have been of poor growth. I do not know if such eroded slopes exist on any considerable scale in the Old Red Sandstone area. Where they do occur they could, I think, be afforested without any particular treatment, though dressing with lime would, no doubt, be desirable.

It is impossible to say for certain whether afforestation of the degraded soils with such unexacting species as *Pinus contorta* would be worth-while without preliminary treatment. The early growth of this species is satisfactory, it is true, but I doubt wheher the older stand, with its greater need for rooting space, would find conditions adequate for survival.

I also found soil conditions similar to those described in the Old Red Sandstone of Clonmel. Attempts at afforestation had failed here, too. It would, however, be quite wrong to judge all soils of the Old Red Sandstone on the same basis. The parent material is not sufficiently uniform for that. The contents of material susceptible to weathering, and of bases, vary within certain limits, and with them so does the resistance of the soil to destructive processes. It is true that we find strong podzolization everywhere, but not in so extreme a form as on the Ballyhoura Hills. I have seen soils in which I should expect the roots to find their way through to the B/C horizon. In my opinion, afforestation should, therefore, be possible, provided, of course, that the site had a suitable climate and is not too exposed to the effect of westerly gales, a point which must always be watched in Ireland.

The examples dealt with here show how necessary an examination of the soil is for all afforestation. This applies not only to the Old Red Sandstone area, but to many other site types, found in such extraordinary variety in Ireland. Examination of the soil is necessary in the first place to ascertain which areas are to be excluded as unsuitble for afforestation. Further, it should throw light on the peculiarities of the soil to be afforested, so that improvement and planting measures can be adapted to the particular local conditions. Soil research will make it possible considerably to reduce failures in the afforestation which is being carried out so vigorously by the Irish State.

TIMBER EXTRACTION BY CHUTE AT GLENMALURE

By WILLIAM SHINE.

Owing to extensive planting operations in Glenmalure Forest in the early twenties large areas are now in urgent need of thinning. To carry out the thinning programme for 1947-'48 many obstacles had to be surmounted, not the least of which was the scarcity of labour in the district. Although good progress had been made from scratch during the previous 4 years in the construction of a forest road system, the areas to be thinned were still far from being reached, and extraction, therefore, presented the greatest difficulty.

The topography is such that road construction is a slow and expensive operation, involving continuous boring and blasting of rock obstacles, deep excavation, banking-up of hollows and bridging of gullies and ravines. As the equipment so far available consists solely of picks and shovels, " jumpers " and geliginite, road construction cannot keep pace with thinning operation; in other words thinning operations are held up on account of the number of workers that must be employed continuously on road construction.

This article endeavours to describe how one particularly awkward and roadless area, where thinning could not be delayed, was dealt with, and how the problem of extraction was solved there.

THE PROBLEM.

The area in question is that shown on the accompanying map as compartments 2, 5 and 8 of Ballyboy Property. These compartments were planted in 1926 with Spruce and Larch mixed. The Larch was used as a sylvicultural species, i.e., with the object of giving shelter to the Spruce on this exposed height. The Larch, however, had outgrown and was badly suppressing the Spruce, so it was necessary to carry out a heavy thinning of the Larch, which was coarse and leaning. Compartment 8, which had been planted with Japanese Larch and Sitka Spruce, needed treatment more urgently than Compartments 2 or 5, which had been planted with European Larch and Norway Spruce.

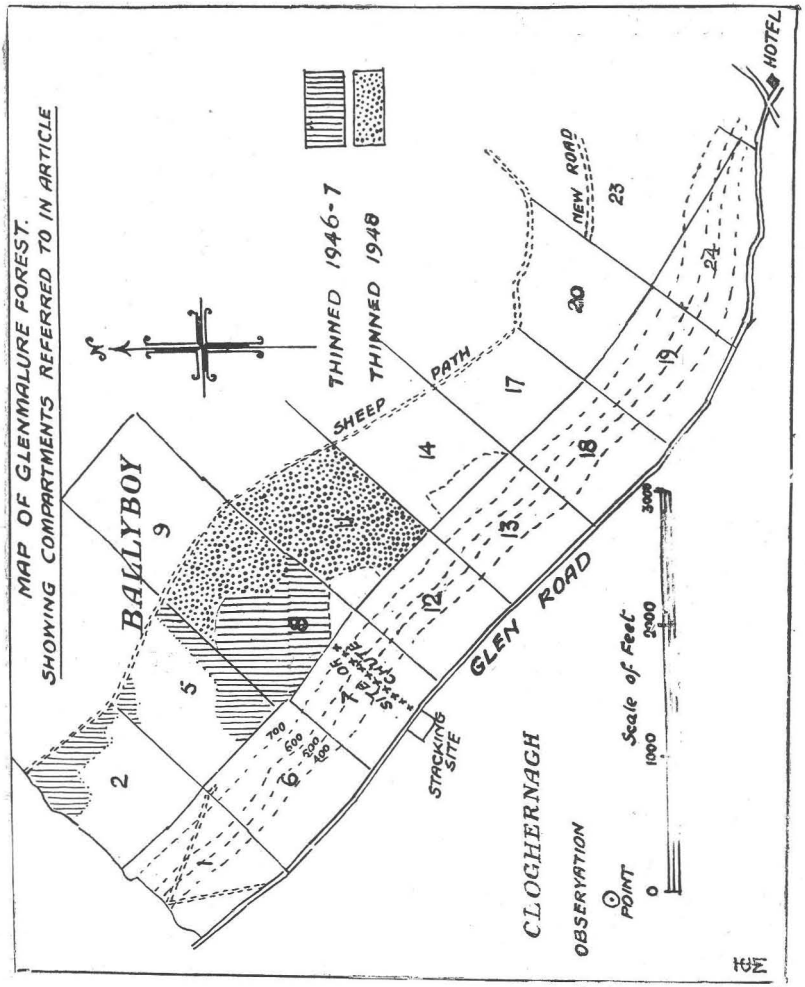
In 1939 the Larch in Compartment 8 was first thinned, and as there was no means of extraction, the felled poles, except those used to fence the adjoining Ballinafunshogue planting area, had to be left on the ground, where they rotted.

At this thinning the poles were approximately 12 to 15 feet long and 3-inch breast height, quarter girth, i.e., nearly 4-inch diameter at that height.

In passing, it is of interest to note that the Sitka Spruce patches then liberated from the " nurse " turned " wolf " made a splendid recovery and are now making a first-rate crop.

In 1947 the remainder of Compartment 8 and Compartments 2

and 5 were tackled, and by the end of March, 1948, all necessary thinning in these compartments was completed. In the meantime the problem of extracting the felled timber was studied. A road which is being constructed through Compartments 29, 27 and 23, and which will eventually serve this area, was still 1½ miles away,



and, as other urgently needed roads were also being constructed, extraction by road was out of the question for at least two years. It was disconcerting to realise that unless some means of extraction were devised, thousands of poles, pit props and box-wood logs, so urgently needed for the saw bench and the collieries, would rot on the ground. Already 3,000 felled trees had been lying here for a

year and a half. The bark was beginning to fall off these logs and in another six months decay would have set in.

The nearest public road to these compartments is 800 feet below. A glance at the close contours on the map will give an idea of the steep gradient all along this face. A reconnaisance was made in all compartmeats along the Glen road in an attempt to get a " sling " path down the face of the cliff. It was hoped to get a zig-zag path or a path running diagonally across the slope in order to get a gradient favourable to " slinging " by horses (or " sligging," as it is called locally). However, this idea had to be abandoned in Compartments 6, 7, 12 and 13 on account of the huge massing of rock or " scree," which blocked every approach to the thinned area.

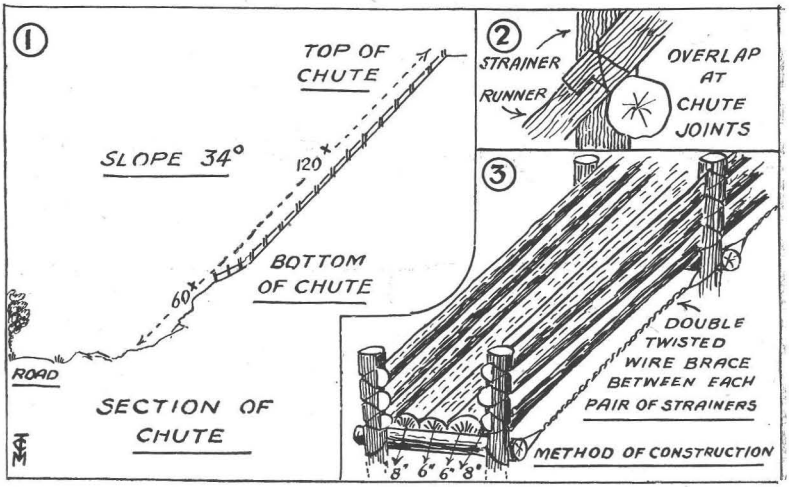
In a final effort to solve the problem a reconnaissance was made from the heights of Cloghernagh, on the opposite side of the glen. Hopes were raised on seeing in the rocky face in Compartment 7 a narrow strip of Spruce leading straight up to Compartment 8. Seeing no gap in the canopy of this strip of 20-feet high Sitka Spruce, the opinion grew that a path might be found there. The gradient, of course, was such as to dispel any hopes of hauling with horses, but at this stage that method had, in any case, been abandoned finally and the construction of a timber chute was under consideration.

On " brushing-up " this strip of Spruce it seemed that a chute could be erected by careful siting amongst the rocks.

CONSTRUCTION.

In November, '47, chute building was commenced. The question arose as to whether the rocks underlying the surface would prevent the setting of the uprights deep enough. Having to blast would have slowed up operations considerably. Fortunately, this proved unnecessary, as in clearing the site many trees were left standing, and they provided admirable uprights when sawn off at a height of about 5 feet.

The construction plan adopted was as follows: To place uprights along the steep portion of the path in two rows about two feet apart and approximately three yards apart in the rows. As far as possible, the uprights were set opposite one another except where rock occurred, when they had to be staggered slightly (for construction details, see sketch). They were of 9-inch diameter, sunk to a depth of three feet in the ground and well tamped in. The length of upright used varied from 7 to 9 feet, being cut on the spot to suit the ground. When all uprights were in position the cross-pieces to support the runner poles were sighted in so as to get an even gradient. The chute was not built to follow the actual slope of the ground, but was made to run in a smooth curve conforming to the general slope but nowhere rising more than a few feet above ground level. The cross-pieces were mortised in on the upper side of the uprights and held in position with wire, all wiring being counter-sunk to prevent the skidding logs from injuring it. The " runners " were



joined by a " scarf " or overlap joint to prevent fouling by the descending logs. The heavy side runners were " shouldered " against the uprights. As far as possible, runner poles were joined at and wired to the cross-pieces. Light poles were used as side rails to prevent the skidding logs from " jumping " the chute.

The bottom or running surface of the chute was built broadly U-shaped. This was arranged by using the thicker runners on the outer edge. In deciding on the sizes of the logs to be used in the structure, allowance was made for the very heavy wear and tear which would occur through friction and vibration. Experience has since proved the wisdom of the strong construction. Before leaving the actual construction it may be mentioned that draw knives (which are a heavy type of spokeshave) proved very effective for quick paring of tenons to give a good tight fit in the mortices.

Surplus Army stores wire cutters were found to be very effective for fast cutting of the wire used in binding all joints. All poles used were peeled; no nails were used in the construction, staples and wire only being utilised. The idea behind this was that when the chute had completed its work it could be dismantled easily and quickly and all good logs used as pit props or box-wood, being free from nails—the bane of the saw-miller's life.

TESTING.

Construction work was completed in June, 1948, and the chute was then tested. The first log travelled at 34 miles per hour and the second at 29 m.p.h., and the average speed worked out around 30 m.p.h.

It was found from this and subsequent tests carried out in wet and dry weather that the construction was sound. At this stage the

side rails had not been placed in position, but it was found that, even in their absence, no log " jumped " the chute. There was one big obstacle, however, which had to be surmounted. The logs were travelling far too fast, and some system of braking had to be devised if the timber were to be extracted undamaged. This was not surprising when it is considered that the angle of elevation of the structure is 34 degrees or, in other words, that the gradient is 1 in 1½, approximately.

It was decided to find the best brake by trial and error. Logs skidded without braking were striking the ground at the base of the chute with such force that they rebounded high into the air and smashed themselves against rocks, or shot off into the plantation on either side for a distance of at least twenty yards. This was disappointing, and it was anything but pleasant to hear the rending crash and to gaze on the remains of sizeable Larch logs!

Among the methods frequently used for checking the speed of the descending logs is one in which the runner poles are bored and fitted with adjustable spikes. The chief disadvantages of this scheme are the cost of the spikes, the labour of boring, and particularly the fact that the runner poles would be spoiled should the structure be stripped and the material put to other uses. Another method is to let the logs run down under control, using steel cable and a winch. The disadvantage of this method is the time taken to tie and rewind the cable after each run.

We first tried trailing logs hanging from overhead cross-bars into the chute. The descending logs, it was hoped, would be slowed down on brushing through a series of these trailers.

On experiment it was found that the speed of descending logs caused these trailers to be wrenched from the ground, tearing the sides and some of the posts clean away. With an easier gradient this brake would prove most effective, having the added advantage that the degree of braking required could be regulated by allowing trailer logs to hang over the sides in fine weather or when the logs were small, when little braking would be required.

After this failure we hit on another idea for preventing damage. The end of the chute was about 2 feet overground, and it was decided to build an addition to it with the gradient flattened out somewhat, and thus cause the logs to plunge into the ground at a lesser angle—approximately 30 degrees. The ground leading directly from this extension was then scooped or hollowed for about twenty yards, from which point the ground fell away steeply. It was not considered advisable to make the extension longer than 12 feet lest the logs should be hurled as far as the public road. A test was carried out as soon as these alterations were completed, and the result surpassed expectations.

All logs, irrespective of size, were slowed up sufficiently after passing over the soil channel to pile up about forty or sixty yards from the glen road.

WORKING.

No log was damaged and it was then a simple matter to haul them with horses from the landing ground to the stacking site on the other side of the Glen road, where, with a portable sawmill, they were converted into stakes, road poles, tripod poles, pit-wood and box-wood. When all details had been attended to, e.g., the enclosing of a stacking area, the erection of warning notices and danger flags for the safety of the public, chuting operations were commenced on a large scale, the head of the chute being fed by a system of drag-paths through Compartments 8, 5 and 2. It was found that the chute extraction rate was one log per minute. The maximum number of poles which can be allowed to pile at the bottom of the chute is 200. If the piles are allowed to get bigger, breaking occurs. As can be readily understood, a couple of hours' chuting is the most that can be done at any one shift. Horses are then switched to the bottom for a day and the timber at the bottom is cleared. By switching the horses a steady flow of timber to the portable sawmill is maintained.

At the time of writing all thinnings have been completed and cleared from Compartments 2, 5 and 8, and Compartment 11 is being dealt with. Compartment 9, which also needs thinning, will also be served by the chute.

COST.

Approximately 300 Japanese Larch poles were used in the construction of the chute, value £10. The labour cost of construction was £65. Allowing £5 for wire and staples, the total outlay was £80.

RESULTS.

The following table gives an idea of the results in the first two months' service:—

TABLE OF MATERIAL EXTRACTED BY CHUTE.

Type of Material	Amount	Value
Used in construction of chute ...	310 Larch poles ...	£10 0 0
Light poles sold locally	280	8 3 4
Stakes produced	3,265	106 6 8
Pit props	1,809	122 15 3
Box-wood	2,500 c.f., U.B.	156 5 0
Firewood (waste ends & off-cuts)	22 cords	32 14 6
Do. (blocks)	2 do.	5 10 0
Road poles	112	4 4 0
Tripod poles	280	4 13 4
Miscellaneous light poles	... ...	10 0
	TOTAL	451 2 1

Note: The above materials were produced from 4,000 poles.

It must be remembered that the usefulness of the chute is far from being at an end. We can look forward to continued results over several years, so that the capital cost, spread over its period of service, will be insignificant. Financially, therefore, it must be considered an unqualified success. In addition, it has enabled a necessary sylvicultural measure to be carried out at a profit and has eased the pressure on road construction and released our labour staff for other essential maintenance and development work in this rapidly-growing forest.

In conclusion, it is only fair to state that the success of the chute is in no small way due to Head Labourer Thomas Murphy, whose enthusiasm, hard work and practical suggestions inspired all to keep going, even when the poles were smashing to pieces and all the work seemed to have been in vain. Acknowledgment is also due to another Mr. Thomas C. Murphy, who kindly prepared the sketches of the construction.

GERMAN FORESTRY TO-DAY

(Below we publish in the form of a letter to his Irish forestry friend an account of the post-war forestry situation in Germany by a German District Forest Officer.—Ed.)

Dear Mr. Deasy,

It is with the greatest pleasure that I follow your suggestion to report to you of our forestry cares of old days and of to-day in the form of a chat.

Forestry relations between Eire and Germany are various, several Irish foresters, amongst them yourself, have seen my forestry area and I had the delight and have still the remembrance of the two wonderful weeks I spent as guest of my friend, the late Mr. Reinhard, in Eire in summer, 1937. In that fortnight I saw a lot of your marvellous country, this island between two continents, and I got an idea of the elements of your work in the forest. I visited Bantry Bay and parts of Kerry, including Dingle Bay and Killarney, together with a T.D., Mr. Flynn, and his friend, Dick, a famous fairy-taler. But I was mostly impressed by the seclusion of Caragh Lake. And several days later I had the great honour to visit, under the guidance of Mr. Forbes, your Forestry School at Avondale and its rich research crops.

The times are such that we look for consolation in beautiful events of the past, because present times are—especially in Germany—otherwise than golden! Therefore, you may allow me the remembrance of my wonderful journey to Eire as an introduction to my lines . . . with the lamenting accentuation of one's own troubles nobody subdues misery. . . .

Irish and German forestry are similar in many respects, but they differ in essential points. Above all, our forestry tradition was never interrupted till now. Germany had the luck to develop since about 1700 out of the original crops which covered its woodlands forests containing a high share of best timber. And these forests educated anew foresters, and these in turn new generations of woods. For the forest is, in contrast with industrial production, not an artificial thing and cannot be withdrawn unpunished too far from nature. We agree in this point with Francis Bacon, who said: "In order to subdue nature, you must first understand her!" (I notice that "nature" is female in the English language, too, and I know why!)

So in Germany, in the south as in the north, a class has been developed called by nickname the "Green Guild," who through generations had, and has, as task, bound by tradition, the preservation and fostering of the forest. Bound to nature, a sixth sense for

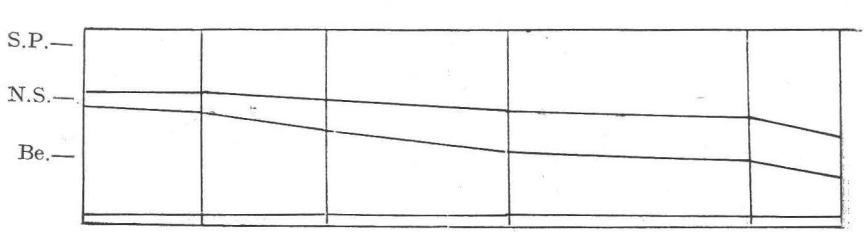
the life and the needs of the forest are qualities of these people, just as if Shakespeare had anticipated when he wrote:

> *" And this our life, exempt from public haunt,*
> *Find tongues in trees, books in the running brooks,*
> *Sermons in stones and good in everything."*
>
> —(" As You Like It.")

This development of the woods from virgin forest to a well-cared forest with the main object of securing the greatest production of high-class timber is now suddenly interrupted by political events, and, therefore, I wish to give to you and your Irish friends a short survey. I shall give you as pattern the circumstances of my local forestry administration (Forstamt) and I beg you to estimate them as *pars pro toto*.

My Forstamt, situated between Kassel and Frankfort/Main (long. 10 degrees E., lat. 51 degrees N.), in 580-1,480 feet elevation on red sandstone, has a productive wooded area of 2,100 hectares State forest and 500 hectares private and communal forests, which are managed at the present day just as State forests. In all there are 6,700 acres. It has 6 forestry centres (each about 450 ha.). The forests lie close together, for the Forstamt has only a total length of 10 miles and is 7 miles wide. This area is stocked at 90 per cent. with wood. There are Forstamts with 5,000-6,000 ha. whose woodlands are not as close together. This results, as probably in Eire, too, from historical events, from the communication roads and from the difficulties of management.

Thinking of the forest vegetation, I have to refer to the second point in which German forestry differs from the Irish. Our activity in the last 100 years was not, in the same degree as yours, directed upon planting and tending the cultures, but more upon the thinning and fostering of older crops (over 30 years). Since 1820 in my Forstamt the virgin woods, containing only few timber trees of beech (*Fagus silv.*), oak (*Quercus sessiliflora*), alder (*Alnus glutinosa*), and hornbeam (*Carpinus betulus*), have been cut in quick succession. These areas have been planted and sown with scots pine (*Pinus silv.*), larch (*Larix eur.*) and, since 1860, with spruce (*Picea exc.*). From this resulted remarkable crops with best volume production and high-class timber. Thus came a change from broad-leaved trees to conifers, which is to be seen in the diagram:



This shows a permanent beech decay from 54 per cent. in 1868 to 14 per cent. in 1946 and an increase of the coniferous area—spruce from 4 per cent. to 18 per cent., sc. pine from 35 per cent. to 59 per cent. Spruce is giving a higher yield, but the Forstamt has many dry southern and south-western slopes, where sc. pine and larch thrive better. Spruce would give, perhaps, for one generation a higher yield, but the productive power of soil would deteriorate, so that another generation of pure spruce would be impossible.

We now come to the species of trees and their frequency. With regard to the *mixtures,* it can be said that mixed crops of one or several light-demanders with a shade-bearer proved particularly useful. Well known are the good mixtures of sc. pine and larch (60-90 per cent.) with beech. We like, too, to set a lower storey of beech under oak. Spruce is very intolerant and the sc. pine becomes a wolf-tree in spruce crops. Single larches in spruce crops are disposed to be affected with canker (*Dasycypha Willkommi*). Japanese larch (*Larix leptolepis*) is without credit here, but closer to the coast it prospers better. We like to mix sc. pine and beech in such a way that we produce from the old crop a natural regeneration of beech on about 20-30 per cent. of the area and plant on the vacant places between in rounded *hursts* sc. pine and larch. On humid northern exposures, too, we plant spruces between the natural regeneration of beech. Also, in a variable tract of land we plant spruce in the fresh valleys, while on the drier ridges and southern slopes we plant or seed pines or larches.

We express the intention in "aimed types" (=normal pattern= model crops) for the different sites; for example, for my Forstamt:

Underlying Rock	*Aimed Type*
Calcareous Strata:	(1) Mixt. beech 80-90 per cent.; maple, ash, elm 15-10 per cent.; larch 5-10 per cent.
Red sandstone (Trias)	(2) Poor southern and s.w. exposures and ridges: sc. pine 65-80 per cent.; beech 35-20 per cent.; larch 10 per cent.
	(3) More humid sites (northern exp., lower part of a slope, valley): as No. 2 but admixture of spruce 10-30 per cent. in hursts and groups *or*
	(4) Sc. pine, larch 50 per cent., spruce 50 per cent., mixed in bigger groups.
	(5) On very humid soils: spruce 100 per cent.
	(6) On very humid and deep soil of high content of nourishing substance:

beech (from nat. regen.) 60 per cent., spruce 40 per cent., mixed by single trees or in groups.

It may be of interest to an Irish forester to hear that the boundaries of the Forstamt, especially these between productive wooded area and agricultural lands, did not change since 1819. New afforestations were executed only on 5 hectares (12.5 acres). From woodland to fields have been converted 81 hectares, i.e., 3.5 per cent. of the wooded area.

The increment of timber of the Forstamt is about 10,500 cubic metres for the State forest area. That means, in the average of all crops, 5 cubic metres per year per hectare or 72.1 cubic feet per acre.

In contrast with this quantity given by nature was the product of fellings in cubic metres per hectare:

1880-90	1891-1900	1901-10	1911-20	1921-30	1931-40	1941-47	1948
1.8	2.0	2.4	4.3	5.0	7.2	6.2	10

That means that we had to cut since 1931 150 per cent. of the increment and, in last winter, 200 per cent.

And so I'm coming to the most important problem of our day, to the problem of the *sustained yield*. This problem excited at all times the minds of the German forestal world. When General Clay said some weeks ago that he had the impression that the Germans love their forest more than their children, he could have been answered: " We love our forest *because* we love our children," i.e., because we think of the future, and that's finally the sustained yield in a far-sighted sense.

The claim of the strictest sustained yield, that the forest of a certain area (here the Forstamt) must provide the market each year with the same quantity of timber for all time to come has been followed by the conception, already disproved, that a sustained yield already exists if all wood areas are producing timber. The newest official formulation of sustained yield (for Hesse) says that it is warranted ,if the productive power of the locality is maintained, respectively brought on, and if the whole area has a full increment of an optimal growing stock of best assortment, and if the uninterrupted regeneration on the whole area is guaranteed! . . . A long definition full of " ifs "! (Please note that nobody is speaking any more of the same annual quantity of timber, and that's the danger, especially in times when the money for replanting is scarce!) The new definition is extensible like elastic, but it is the child of necessity.

Out of its growing stock (170 cubic metre per hectare in my Forstamt) the forest has to give the timber necessary for the reconstruction of our towns and for reparations. For this purpose are to be sacrificed first:—

Beech: All crops III-IV class of yield table and less, 81 years and older; all better crops 121 years and olders.

Sc. Pine: All unthrifty crops 61 years and older; all crops less than 60 per cent. stocked; all crops older than 100 years.

Spruce: All crops less than 60 per cent. stocked; all crops 81 years and older.

In my Forstamt that means that 23 per cent. of all woods are to be cut in the next 15 years! But that's not as bad as if *all crops* would be thinned inexcusably too much in the next years.

To explain the deficiency of timber in Germany I may say that, of the original German woodland of 12.7 million hectares, 5.7 millions now belong to the sharply isolated Eastern Russian Zone and 7 millions to the Trizone (i.e., American, British and French occupied zones). The increment of this Western Zone may be estimated at 21 million cubic metres, but the consumption of timber, even without reconstruction and without reparations, is 45 million cubic metres. In an economy with sustained yield the *deficit* in the Western Zones is yearly 24 million cubic metres and must be made good out of our own growing stock because we cannot pay for the import of timber.

Notwithstanding, there have been cut, mostly in direct-cuttings by the British Occupation Forces, *only in one county* (North Rhine-Westfalia) in 3 years and exported:—

To Belgium	732,000	cubic metres
To Holland	1,000,000	,,
To England	6,300,000	,,

These are official statements of the British Occupation Forces. In the American Zone—God be praised—no direct cuttings were carried out, but here, too, 10 per cent. of the cutting is exported to England. We all consider the restitution of the harm done our neighbours as righteous, but you may imagine that such exports are not very popular considering that there are 2,000,000 destroyed German houses! The German forestry of the Trizone is not able to cover the requirements of that area. All the severer is it hit by such forced exports of undressed timber and all the faster will be the destruction of the German forests.*

Particularly the clear cuttings on big areas and irrelevant methods of lumbering operations (in the British and French Zone) trouble the foresters and the whole population. We have to warn always of the catastrophic consequences (climate, erosion, structure of the soil and swampiness) of such methods. In those things you in Ireland have a great experience on your own cleared woodlands!

This programme of increased wood cutting has—of course—as a consequence an increased planting programme in the next years.

*We have just learned from Forstmeister Scherer that currency reform has eased the timber situation and that exports to Britain have ceased. It is now hoped that the 1950 cut will not be much more than the increment. —Editor.

Beech will be repressed further, because she has not enough time for natural regeneration in these quickly following cuttings; scots pine, spruce and larch will have a bigger share in future.

In the last three years a very high proportion of timber was used as fuel wood. In 1862 it amounted to 76 per cent. of the product of cutting; in 1938 only 24 per cent., but by 1945 it was 45 per cent. The reason is the fall in the output of coal and the failure of transport of coal after the war. As a measure to produce fuel wood, we often arrange that our wood-cutters fell trees and the interested population (and who is not interested in fuel wood in cold winter!) works them up. This method is very suitable for first cleaning in small crops because foresters are sure that only the intended trees are cut. Purchasers pay to the wood-cutters for felling half of the normal ordinary costs of harvesting. We now clean all young crops of 18 years and upward; that means that we are cutting stands I planted in the years 1926-1930. It is a proud feeling to walk in the shadow of woods you planted and it gives you much experience to see the results of different mixtures and planting distances. In such crops we cut at first only wolf trees and trees peeled by stags.

In our quick—and hasty—living time with its quickly changing demands, working plans intending to regulate the cutting up to 20 years in advance proved to be unsuitable. In lieu of that we prefer a test of the growing stock and the development of the economy at short intervals. This test must be executed in the shortest time (4 weeks a Forstamt) everywhere at the same moment. Parallel with this test must be made a thoroughly worked plan of regeneration.

Aimed at is a higher mixture of the conifers; spruce, larch, Douglas fir and scots pine on soils fit for them. The crops of this county now comprise:—

Oak	Beech	Conifers
11 per cent.	39 per cent.	50 per cent.

The target is approximately:—

7 per cent.	28 per cent.	65 per cent.

Concerning the method of restocking we like to regenerate naturally the old oak and beech crops to the extent of 20-35 per cent. of the area, allow these young leaf trees to reach a height of 2 feet by several openings of the shelter wood until finally the area is clear felled. We then plant on the vacant places,, i.e., on 65-80 per cent. of the area (ground not occupied by the natural regeneration) conifers, 1 or 2-years-old scots pine, 4-year spruce and 2 or 3-year-old larches. The planting distances are as follows: Pine at 4 ft. x 1 ft., small spruce at 5 ft. x 2 ft., good 1 ft. high plants at 6 ft. x 2 ft. Larch we plant 6 ft. x 2 ft. also and like to use it in the final planting.

On less grassy slopes of the red sandstone we like to carry out direct sowings on prepared strips 1 ft. 8 ins. wide and 4 ft. 4 ins.

apart. A mixture of 4 lbs. scots pine (90 per cent. germinating power), 1 lb. European larch, and 0.5 lb. of spruce has proved very satisfactory. The resultant seedlings grow side by side with the natural regeneration of the broad-leaved trees and melt together to form a mixed crop. At latest within 20 years, the first cleaning cutting, described before, ensues. Improvement cuttings then follow at 3-5 year intervals in the famous tried manner: *early, moderate and often*. Beginning with the age of 40 we calculate at a 3-year interval a production per hectare of 12-18 cubic metres for sc. pine and beech, and 20-25 cubic metres for spruce. Thinnings are marked during the summer time, tree by tree, by the foresters themselves with a timber scribe. We consider it as our most important task not only to plant the forest but to foster it too, and to form it with our hands so that its quality becomes better and better and that the increment takes place only on its best trunks, that the proportion of the mixture between the conifers and broad-leaved trees is the right one, and that noxious and sick trees are eliminated in time.

Between 1930 and 1935 we marked with a black paint ring in the better pine-beech mixed crops, 60-90 years old, at an approximate distance of 8-10 metres apart, the 160 best trees on each hectare with good crowns and good stems as "care-trees." These trees had to be tended at each thinning by setting them free gradually. Maybe this measure is too drastic, and it is to be seen now after 15 years that some of these " care-trees " did not become what they promised, and that other trees, which did not look as well, developed better. On the whole, however, it was a good measure, because during the war the thinnings were executed by untrained men, foresters being mostly anywhere in Europe as soldiers. By the marked best trees these substitutes knew what they had *not* to cut in the thinnings. So these crops survived the war comparatively well!

During the war and especially now it is very difficult to bring the demands of the economy into conformity with the most primitive principles of silviculture. We need always again the highest silvicultural art to ensure that the forest does not suffer too much damage and that it can satisfy the demands not only now but in future too. The forest is only able to do this if the overcuttings are not made by an excessive opening of young crops, but, in case of emergency, by sacrifice of whole old crops, which must be regenerated in the shortest time.

The timber requirements are secured by an impost in the different assortments (lumber, mine-timber, pulp-wood, generator-wood, fuel-wood) on the different Forstamts before the beginning of the year (1st October) according to the efficiency (increase and growing stock) of the forest centre. The Forstmeister determines where and how the cutting will be done, observing the silvicultural rules. Cutting is done by forest labour; the foresters survey the timber; the

Forstmeister, more or less, controls each cutting and sells the timber to the timber merchants, but mostly directly to the local saw-mills. With a yearly product of cutting of 20,000 cubic metres, I have permanently about 60 wood-cutters. Timber is sold to 7 saw-mills. Mine-timber and pulpwood are sold through a timber-merchant to the mines or factories.

We German foresters wear in service a dark-green uniform. The abundant silver decoration, that we never loved much because it was not suitable in the forest, has disappeared and we again work unadorned in the forests. Our ranks are thinned, many having given their lives on the battlefields of Europe. Foresters who fled from the east filled up our ranks, but they do not all find work in the forest, because there was a lot of forest in the lost territories. But we kept our idealism to work for the forest, for the satisfaction of timber requirements of the population now and in the future, and to contribute in this way our part in the reconstruction of a peaceful and happier country. This idealism we kept and we will keep it. An old maxim says:—

"Foster the forest, it is the certain source of prosperity;
Quickly it is devastated by the axe—slowly it grows!
All our work our descendants will judge;
Let us care intentionally to-day that they'll praise us in the future."

(In German language this is in hexameters.)

Finally, a few words about hunting, being for each German connected inseparably with the forest and with forestry. Nearly every forester was a hunter and gamekeeper. In my forest there are roes (*cervus capreolus*), which we had before the war in great numbers. But they were too confident to the conquerors and, therefore, they were killed. Indeed, we have now only 5-8 per cent. of the pre-war number. In many districts, therefore, the roes are out of season the whole year. Further, there are stags (*cervus elephas*), about 40-50 head in my district. They do a lot of damage in the fields, and in the forest, too, by peeling the spruces and browsing on young plantations. Boars are about 25-30 head (after 60-80 in 1945) here, and ruin potato-fields round about. We, together with hunters of the American Occupation Forces, shot in the last 18 months 68 boars. An American lieutenant killed a boar of 350 lbs. (cleaned).

Hunting is now a privilege of the Occupation Forces. Since June, '48, the German foresters have, as Forestry Police, a few rifles again and the order to kill boars. But this is not to be regarded as sporting hunting but as a police measure.

At hunting parties of the Occupation troops (contrary to the German custom of hunting single—walking and sitting) we co-operate. The success of these hunts depends, naturally, on the goodwill and

trust of both parties. I find those hunts absolutely necessary to reduce the damage of the game in the fields and in the forest.

I have tried to give you and your friends a short summary of our practical work here in German forestry. If sometimes we all seem to be playthings of Fate—when I recently read " King Lear " I was deeply touched by the verses:

" As flies to wanton boys are we to the gods,
They kill us for their sport "—

we never have the right to despond, but we have to work as men confiding in a higher justice, to work in the frame of our tasks and to do our duty.

I greet you over the seas in your green island. Waidmannsheil!

K. SCHERER.

OBITUARY

CAPTAIN L. D. TRANT

Members will have read with regret the announcement in our last issue of the death, at the age of 61, of Capt. Lawrence D. Trant, of Dovea, Thurles.

With Mrs. Trant he had attended several meetings and excursions of the Society, when he made many new friends amongst foresters. In his early years he had been engaged on engineering construction in the Argentine, and he served with the South Irish Horse in the First World War. He was keenly interested in the development of co-operative methods of farming and, to this end, he sold his estate to the Centenary Co-operative Company for little more than a nominal sum. He had the pleasure of watching this enterprise grow into one of the most progressive and up-to-date farming organisations in the country.

His self-sacrifice for the encouragement of co-operative farming was typical of a man who was noted for his kindness, courtesy and sincerity and whose life was marked by numerous acts of charity done by stealth.

THE COVER PHOTOGRAPH

The cover photograph of this issue is by courtesy of " Times Pictorial."

It shows Mr. M. O'Beirne, President of the Society, standing beside a Wellingtonia in one of the first plantations laid down at Avondale after it opened in 1906 as a Forestry School. Mr. O'Beirne himself was a member of the first class and has just recently retired from the position of Superintendent of the school on reaching the age limit.

The one-acre plot of Wellingtonia (*Sequoia gigantea*) was planted in the spring of 1906. The Wellingtonias were planted at 12 feet apart in a matrix of European Larch at 4 foot spacing. The larch nurses were mostly removed in thinnings, but a few still remain.

Of the 300 or so Wellingtonias originally planted, 168 were still standing when the plot was measured in May, 1948. These varied in quarter-girth between 6" and 22"; the average total height was 70 feet; the average timber height was 60 feet. The nett volume by the 40% method was 4,560 Hoppus feet.

The situation (Compt. 15) is well sheltered, the elevation being 300 to 400 feet. The soil is a deep, fertile, shaley loam. The trees are quite healthy and are still growing vigorously, some bearing cones (which take two years to mature). In contrast *Sequoia sempervivens* under similar conditions of soil and situation did not do nearly so well, having suffered severely from frost injury.

ANNUAL GENERAL MEETING

The Seventh Annual General Meeting of the Society was held in Jury's Hotel on the 16th March, 1949, at 7.45 p.m. Mr. O'Beirne, the President, was in the Chair. Over 40 members were present. At the suggestion of the President, the minutes of the previous meeting, which appeared in the Journal, were taken as read and duly signed.

The Secretary then read the Council's report for year ending 31st December, 1948.

Council Report for 1948

The Council met on the 16th March, 1948, in Dublin and appointed sub-committees to deal with arrangements for excursions and the publication of the Journal.

At a meeting held in Sligo on Tuesday, 1st June, the Council decided to organise an excursion to North Wales in May, 1949.

A further meeting of the Council was held on November 15th.

The average attendance at meetings of the Council was eight.

MEMBERSHIP

During the year 15 Associate, 3 Grade I and 1 Grade II members were enrolled. There are now 88 Associate, 33 (29) Grade I and 44 (66) Grade II technical members. The Secretary has, at recent council meetings, drawn attention to the shrinking support forthcoming from technical members. This is a deplorable state of affairs. Our Society, through its Journal and its meetings, is playing a very powerful role in keeping the case for forestry before the people. The Society can claim to have brought forestry before the country in a way that could not otherwise have been achieved and, as a result of our activities, forestry is becoming a very live issue here. Foresters stand to benefit by any increased support we can win for forestry. Further, the country is looking to us for a lead, for an act of faith in the future of forestry. If the Society loses the active support of foresters it cannot expect the outsider to maintain enthusiasm. We must congratulate ourselves on our growing associate membership. The attendance of associates at meetings and the unmistakable keeness shown is a tribute to our work. We appeal to those people and to foresters as well to act as recruiting agents for the Society. In every district in Ireland there are people ready and anxious to join in this great national work. The Council cannot contact those prospective members nor can the finances of the Society run to advertising in a big way. It must be recorded, however, that there is a noticeable increase in the re-enrolment of lapsed members. This is a very encouraging sign. The Council desires members to inform lapsed colleagues that the Secretary is empowered to re-enrol lapsed members on receipt of the current year's subscription.

FINANCE

The abstract of Accounts for 1947 has been sent out to all members. Our income from all sources amounted to £161.19.0.

We are again indebted to Mrs. A. H. Henry for a further donation of £25 to forward the work of the Society. This splendid gesture might well be copied by some of our leading statesmen or industrialists. Articles III of our Constitution says hopefully . . . "The Society . . . shall have power to accept from members and others donations either in money or otherwise to its funds and property, and bursaries and prizes to be awarded in furtherance of its object."

The Council wishes to pay tribute to the work of our Honorary Auditor, D. M . Craig, for his capable assistance and advice on matters relating to the finances of the Society.

JOURNAL

One issue of the Journal appeared during the period under review. The standard of the Journal is being maintained; in fact, we claim it has greatly improved and is sought after by a growing number of forest services and colleges in every part of the world. The F.A.O. Organisation, when requesting to be put on the mailing list, stated that our Journal was the only Irish publication keeping this important subject before the eyes of the world. Our Journal is now read in Britain, Canada, the U.S.A., Sweden, South Africa, New Zealand and Holland. The articles by our members are reviewed—often at length—in the journals of other Forestry Societies; in Forestry Abstracts put out by the iImperial Forestry Institute, and by the F.A.O. organs.

The cost of printing a small issue of 500 copies is a very heavy tax on our limited resources. The Business Editor has been active in securing advertisements and has had very considerable success. We trust our members will give support to those advertisers who have supported us. Again we would like our members to try to increase our sales of Jornals. The county libraries have so far ignored our publication, while periodicals of a much poorer kind clutter up the reading rooms. If our members would approach the public authorities concerned and ask to have our Journal available it would be a great day's work for forestry. The County Committees of Agriculture, the Vocational schools, the public schools, should help. If our circulation increased to 1000 copies it might be possible to provide a quarterly issue and thereby improve our service to foresters and forestry alike.

EXCURSIONS

The Report of the Annual Excursion to Sligo on the 1st, 2nd and 3rd June appears in Vol. V, *Irish Forestry.*

A further successful excursion was held in Camolin Forest in October.

To judge by the letters from members, it is apparent that these excursions rank among the most popular functions of the Society. Every member is privileged to introduce two guests to our excursions and meetings, and the Council believes that there is no better way

of making a life member than by his attendance at one of our excursions.

The Society is deeply indebted to the Minister for Lands and the officials of the Forestry Division for the facilities and unfailing courtesies enjoyed by our members attending the excursions.

LIBRARY SCHEME

The demand for forestry books has been very slack in recent times and we look forward to an improvement in this direction. The Secretary will send a list of suitable books to members wishing to avail of this service. The Secretary is also prepared to help members anxious to get literature on a specific subject, especially members wishing to contribute to the Journal.

TREE REGISTRATION

There is little to record under this heading and the Council is anxious to discover the reasons for the lack of interest in this useful type of work.

The adoption of the report was proposed by Mr. Moorehead who paid tribute to the zealousness with which the Council had conducted the varied activities of the Society during the year. Mr. Sharkey in seconding congratulated the Council on its work. "The smooth running of the various outings was" he said "a fitting testimonial."

Abstract of Accounts.

The adoption of the Abstract of Accounts which appears elsewhere in this issue was formally proposed by Mr. Hanahoe, seconded by Mr. Deasy, and unanimously passed.

The President, in accordance with the custom of the Society, then delivered his address reviewing matters of Forestry interest

PRESIDENT'S ADDRESS

Ladies and Gentlemen,

The most remarkable development in Forestry circles during the past year was the sensational announcement by the Minister for Lands that the annual planting programme was to be stepped up to a minimum of 25,000 acres until a total of one million acres of forest is reached. This has been, I know, a most welcome announcement to our Society which has been ever conscious of, and through its Journal has from time to time drawn attention to the paucity of our native resources, the heavy inroads caused by the War, and the inadequacy of the previous policy to ensure supplies for the future generations.

Allowing for a nursery area equal to 5% of the annual planting programme, an expansion of state nurseries to 1,250 acres will be required in order to supply about 45 million plants for planting and 5 million for replacing failures every year.

It would also be necessary largely to expand land acquisition in order to build up a reserve equal to at least three times the annual

programme. This was the minimum necessary for smooth working in order to avoid dislocations in plant supply. It should be remembered that it took three to four years to grow the plants.

The President then announced the result of the election of office-bearers for 1949, which are given on Page 2. The election of the new Council was formally confirmed by the meeting.

AMENDMENT IN CONSTITUTION AND RULES

Mr. FitzPatrick, in accordance with the Society's rules, proposed confirmation by the General Meeting of the Constitutional amendments proposed by him, seconded by Mr. Mangan and passed unanimously at the general meeting last year. These Constitutional amendments have been set out at length in Vol. V., Nos. 1 and 2 of the Journal.

In proposing that the General Meeting confirm the unanimous decisions of last year's general meeting, Mr. FitzPatrick stressed the importance of Associate Members who now outnumber technical members.

Mr. Clear, in seconding, proposed the following amendment that " the Society should be composed of two classes only, Technical and Associate."

Mr. McMahon seconded Mr. Clear's amendment.

Many members took part in the general discussion which followed. On a point of order being raised, Mr. Clear withdrew his amendment. The President then put Mr. FitzPatrick's proposition to the house and it was unanimously carried.

EXCURSION

The Secretary informed the meeting that over 50 members had enrolled for the Annual Excursion to North Wales which was to be held during the last week in May. Arrangements had now been completed for the accommodation and transport of the party and he assured the members that our hosts, the British Forestry Commission, had most painstakingly prepared an itinerary covering every phase of forestry in North Wales.

The President then introduced Mr. Freeman who delivered his address on " Forestry and Land Use Survey ", which will appear in our next issue.

DISCUSSION FOLLOWING MR. FREEMAN'S PAPER

Mr. Meldrum, Director of Forestry, proposed a very hearty vote of thanks to Mr. Freeman for his most instructive and interesting address. "He has traced for us" he said, "the dismal history of the catastrophic decline in Irish woodland, a decline which was not accompanied by a corresponding increase in reclamation for agriculture, and he has shown us how, through economic pressure and other causes, the poorer and more remote areas have been gradually abandoned. Continuing, Mr. Meldrum pointed out how appropriate Mr. Freeman's subject was at the present time when two dynamic proposals by the present Government had been submitted to the

country. The first was the rehabilitation of 4 million acres of agricultural land and the other an annual planting programme of 25,000 acres until a total of one million acres of forests should be attained. This latter proposal might seem very ambitious but, if we desire even to attain the Western European standard, the forest area to be established should be in the neighbourhood of $2\frac{1}{2}$ million acres.

He reminded us that the ravages of the various invaders from Strongbow up to Cromwell and beyond, pale into insignificance beside the depredation of two classes of people which are too numerous in the country, namely the Hill Grazier with his annual degradation of the soil by burning and the other class who " scraw " the surface for fuel.

The future of Forestry was not in the Demesne lands. It must look to those marginal and submarginal lands at present monopolised —as a perusal of " Holmes Report " reveals—by an indifferent agriculture. It would take a great deal of education to convince these graziers that in the national interest much of the land overrun by them should now be returned to the forest. This will revive the age-old controversy of timber versus mutton and wool, but the long term interests of the country must be put first. The Forester had a very strong argument even on a short term basis, i.e., the incomparably greater volume of employment which afforestation provides on a given area as compared with sheep grazing. His long term argument was the capital values which would be created in the form of timber supplies—the raw materials for other industries which would provide far greater employment than the forest itself. In a country such as this, comparatively lacking in coal, iron and other minerals, dependence must be placed on wood as its main, indeed only hope, for continued prosperity and an improvement in the standard of living.

Unfortunately, he concluded, there is not at present in this country a Land Utilization Authority; but he hoped that the realization of the importance of such a body might come about eventually.

The observations and conclusions of Mr. Freeman were a step in the right direction and he deserved a special vote of thanks for his valuable address.

In this connection he had pleasure in informing members that the District Forestry Officers were now engaged on a Survey of Plantable Land on the scale of one inch to one mile which would form the basis of the new land acquisition policy.

The vote of thanks was seconded by Mr. Orpen, who paid tribute to the Lecturer for his most stimulating talk, in which he expressed no opinions but stuck to observations and facts and stressed the vital importance of proper land use. He was glad to have this opportunity to speak to foresters. " People " he said " were prone to compare things which were incomparable, and so it is with forestry and sheep farming."

The question raised by Mr. Meldrum, he continued, of the impoverishment of land under sheeep grazing so that we speak in terms

of the number of acres to the sheep, could easily be revised if some capital were put into the land. Lack of capital in the past, and even to-day, militated against successful sheep farming. This has been proved beyond doubt by the Experimental Stations in Wales and Scotland. Upland pastures have been successfully reseeded up to 1,400 ft. in Wales; and in Scotland, the protein necessary to digest the roughage had been made available by allowing sheep to graze for three hours once every three days on pasture near the house which had been heavily dressed with nitrogenous manures.

Above his own farm which runs from 400 ft. to 700 ft. on a south-eastern slope, he had seen oats harvested at 1,200 ft. on an area which at one time it was proposed to afforest.

Mr. FitzPatrick, associating himself with the vote of thanks, said that "it was gratifying to hear a layman say the things we foresters would like to say, but never seem to get around to saying." He spoke at length on the value of a proper land survey and stressed its urgent need if we are to make the proper use of land in our time.

"The Forestry Department are to be commended" he said "on the survey which they are carrying out at present. If this work is to be satisfactory it must be done in collaboration with the agricultural technicians, for it must be remembered that so much can be achieved by so little manuring."

"Once the proper survey has been carried out" he continued "let the land suitable for forestry be put to forestry. Then the responsible authority can establish the much needed research station and plan in an orderly fashion not only for for this rotation but also for the next."

SOCIETY OF IRISH FORESTERS

Statement of Accounts for the Year Ended 31st December, 1948

INCOME

1948		£ s. d.	£ s. d.
Jan. 1	To Balance from last Account:		
	In Secretary's hands ...	5 13 7	
	In Bank on Current A/C	182 19 9	
			188 13 4
Dec. 31	To Subscriptions received:		
	1. 1st Grade Technical, 1946	1 0 0	
	5. 1st Grade Technical, 1947	5 0 0	
	30. 1st Grade Technical, 1948	30 0 0	
	2. 1st Grade Technical, 1949	2 0 0	
	1. 2nd Grade Technical, 1946	10 0	
	9. 2nd Grade Technical, 1947	4 10 0	
	33. 2nd Grade Technical, 1948	16 10 0	
	2. Associate, 1947	1 10 0	
	70. Associate, 1948	52 10 0	
	1. Associate (balance), 1948	10 0	
	6. Associate, 1949	4 10 0	
	1. Associate (on A/C), 1949	5 0	
			118 15 0
,, ,,	Journals sold		18 4 0
,, ,,	Donations received from Mrs. A. Henry		25 0 0
			350 12 4

EXPENDITURE

1948		£ s. d.
Dec. 31	By Stationery and Printing	13 5 3
,, ,,	Printing of Journal	105 10 6
,, ,,	Postages	8 18 11
,, ,,	Expenses in Meetings	1 10 0
,, ,,	Bank Charge	1 1 0
,, ,,	Excursion Expenses	4 4 6
,, ,,	Secretary's Honorarium	15 0 0
,, ,,	**Balance:**	
	In Bank on current A/C 202 17 11	
	Less amount due to Sec. 1 15 9	
		201 2 2
		350 12 4

I have examined the above Account, have compared same with vouchers and certify it to be correct, the balance to credit of the Society being £201 2s. 2d., which is on Current Account in the Ulster Bank, Ltd. Credit has not been taken for Subscriptions for 1945, £1 15s. 0d.; for 1946, £4 15s. 0d.; for 1947, £16 0s. 0d., and for 1948, £31 15s. 0d., which were outstanding at 31st December, 1948.

23rd February, 1949.

D. M. CRAIG, Auditors and Accountants,
102/103 Grafton Street, Dublin.

DAY EXCURSION TO CAMOLIN

Report by Peter Butler, B. Agr. Sc.

An excursion to Camolin State Forest was held on the afternoon of October 2nd, 1948, by kind permission of the Minister for Lands. The attendance of over forty again proved the popularity of the local excursions and fully justified the efforts of the Council, Covener and Forestry Division Staff. The members and friends present were as follows :-

O. V. Mooney, (Divisional Inspector), D. McGlynn (District Inspector), E. Munnelly (Forester), M. O'Beirne, (President), T. Clear (Secretary), T. McEvoy (Covener), Mrs. Hughes, Mrs. Keane, Miss W. Grey, Mr. and Mrs. Scally, Mr. and Mrs. McNamara, J. Deasy, M. Sharkey, N. Morris, J. Crammond, J. Galvin, M. Connolly, J. J. Shiels, W. Morris, J. Hanahoe, H. M. FitzPatrick, M. Dooley, T. McCarthy, J. Doyle, M. Smith, F. McMahon, T. Prior, M. Swords, J. Rouine, P. Grace (U.S.A.), P. Harte, J. O'Hara, J. T. Wassink (Holland), T. Kelly, L. F. Brannigan, P. B. Casey (Editor: *Drogheda Independent*), P. Ryan, Wm. Shine, P. Butler.

Members were welcomed by the Covener and by Mr. Mooney on behalf of the Minister for Lands. Mr. Mooney outlined the history of the estate,—explaining that it was one of the Department's earliest acquisitions. In the early days the intention was to manage it on similar lines to Avondale. About 190 acres were bare land and 450 under mature mixed Hardwoods. Nearly all the ground was ideal for timber production,—the drier slopes for the more exacting trees and the wet low-lying flats for Spruces. Only the better known speies were used in the actual planting which began in 1909. Mr. Mooney mentioned that several members present had been in charge of the forest at one time or another and their first-hand knowledge proved extremely interesting in discussing individual plots later.

To-day the forest is a series of remarkably fine stands. Unfortunately the party had to move rapidly but, in passing, such outstanding plots as that of Abies Grandis was commented on. The trees are exceptionally clean and tall, with smooth bark and only a few light twigs interrupting the view of the upper crown. This plot was planted in 1919. The present average stocking is 500 stems per acre with an average dominant height of 55 ft. Although the stand had been thinned some two years previously, most members considered that thinning was again due, especially as this species tends to become a crop of " whips ", easily broken in a storm, if neglected. A vivid illustration of the greatly increased costs of afforestation was provided by some quotations from the forest records of that period —a typical example being: in 1916/17, 16/- per week for labour, £1 per 1,000 for plants and the total cost of labour and plants per acre approximately £3.

Interesting examples were seen of Adelges-ridden Douglas fir, which had been subjected to a heavy crown-thinning, resulting in a considerable improvement in health and vigour of the crop. It is now very open and a vigorous growth of briars and grasses have invaded the ground. The figures of a one tenth of an acre plot from one such area were supplied, and are as follows :-

Age : 39 years. Stems per acre : 270. Quarter girth at half height of 40% tree : 5½ inches. Total height : 65 ft. Timber height : 50 ft. Volume per acre : 2551.5 c.ft. According to the British Yield Tables this plot compares in height growth with 4th Quality Class.

Areas of Douglas Fir which were badly infested with Adelges and beyond reasonable hope of recovery, were clear felled recently and planted up with spruce.

The history of larch as a nurse species here, runs on parrallel lines to Avondale. It was successful in some cases but in others suppressed the intended main crop. An instance of the former was well demonstrated by a very fine crop of Larch and Spanish Chestnut, about 27 years old. The Chestnuts are now beautifully tall and clean and the last of the larch, having outlived its usefulness as a nurse, are now marked to come out. As an instance of the nurse suppressing the intended main crop, an area was seen where P. Strobus, attacked by rust, was dying out and larch was now left. The larch in turn has been underplanted with Lawson Cyprus to keep the ground clean.

Many lowlying areas were laid down to spruce plots. One such, " The Snipe Bog "—as the name would imply—was a badly drained and frosty site. Both Norway and Sitka occur in intimate mixture and, though showing signs of having been severely checked for a long period early in their life, they are now growing very vigorously. Most of the members who worked in the area in the early days attributed most of the damage to the late frost of 1912, the same frost that is recorded to have badly damaged many similar plots in Avondale. The following are representative figures for the crops on this " Snipe Bog " area, and are taken from one-tenth acre sample plot of N.S. Age 38 years. Q.G.O.B. at height of 40% trees : 6 ins. Total height : 55 ft. Timber height : 43 ft. Number of stems : 48. Volume U.B. of 40% tree : 9.68 c.ft. Volume U.B. per acre 4,646 c.ft. The thinning which had been recently carried out was not taken into account. This plot compares favourably with Quality Class II of the Yield Tables which shows a height of 58 ft. at 40 years, 400 stems per acre and a volume of 4490 c.ft.

On a drier site, 38 years old Sitka spruce, which originally had been mixed with European larch, gave excellent growth figures. The larch has been completely removed giving a pure but open crop of spruces. Measurements from a one-tenth acre sample plot are as follows :-

Total height of 40% tree : 80½ ft. Timber height : 63 ft. Number of stems per acre : 280. Q.G.O.B. of 40% tree at half timber height : 7 inches. Tree volume U.B. : 19.29 c.ft. Volume per acre U.B. 5401 c.ft. The height growth here is directly in line with first

Quality British Yield Table figures, but with 305 stems per acre the normal B.Y. Tables give a volume per acre of 7,090 c.ft. A good deal of discussion arose from this case on the merits or demerits of wider planting spacing as the spruce for a great part of its life has grown as if planted at 12' x 12' owing to the early suppression of the larch.

In the old woodland areas soil profiles had been specially prepared. These showed a very deep "brown earth" derived from Silurian rocks,—an excellent site for oak and beech. Members had an interesting discussion on the methods used in renewing this part of the forest, where rather open old oak woodland predominates. Circular openings varying from ½ to 2 acres have been made and planted with oak and beech. Owing to the heavy ground vegetation of briars, bracken and grasses, little natural regeneration, except of birch, is present. This presented a striking contrast to another area where many conifers, including Sitka, Scots, Larch and Weymuoth, were regenerating freely and establishing themselves under a light stand. The ground vegetation is sparse, Erica, Calluna, Gorse and Polytricum mosses being most in evidence. It appears that regeneration followed a ground fire a few years back.

Members were also interested in several promising groups of Macrocarpa, the result of direct sowing of the seeds in openings and also in the very rapidly growing groups of Eucalyptus (E. Mullerii).

A flying visit was paid to the nursery. In all, about 14 acres are cultivated, containing good seedbeds and excellent transplants. Soil and situation are very favourable and members were impressed by the layout and cleanliness.

Members assembled before parting to express, in so far as words could, their thanks to the Minister, the Society and especially to the officials, messrs. Mooney, McGlynn and Munnelly, who spared no effort to make the occasion both pleasant and instructive. The excellent luncheon arrangements were particularly appreciated.

VISIT TO SAWMILLS

On the afternoon of the Annual General Meeting, March 16th, 1949, a large party of members inspected the extensive sawmill and timber yard of Messrs. T. and C. Martin at North Wall, Dublin, by courtesy of the management.

Members were impressed by the efficient organisation and lay-out to deal with timber imports. The high pressure creosoting plant, in which Post Office and E.S.B. poles are treated, was also seen in action.

EXCURSION TO BIRR
9th APRIL, 1949

The Society's outings for 1949 began auspiciously with a visit to the Earl of Rosse's estate at Birr on Saturday, 9th April.

Members totalling over 40 assembled at noon at the estate sawmill in the town, where they were met by our valued fellow-member, Mr. Chisholm, forester and sawmill manager to the Earl of Rosse. He showed members over the very well-equipped sawmill and workshops, where timber from the estate woods and purchased plantations is worked up for use on the estate's extensive house property and for local carpenters and cabinet-makers. Of particular interest was the extensive selection of home-grown timbers in the plank on display. Pedunculate and sessible oak, wych and English elm, were contrasted, while Hornbeam, Plane, Cherry, Wellingtonia, Abies grandis, Japanese larch, Cedar and Douglas were among the more unusual species. Some very fine carved oak panelling was also examined.

The party was most generously invited to lunch at Dooley's Hotel by the Earl of Rosse, after which we were conducted over the estate woods by the Earl and Mr. Chisholm. These woods are situated on a complex system of esker ridges consisting of coarse limestone gravels, on which drought and the extreme alkalinity of the soil combine to produce a rather difficult site for the cultivation of timber. The older woods are mostly of hardwood type, with oak predominating. Douglas is frequent in the middle-aged plantations, while Scots and larch appear in the younger stands.

The status of the pedunculate oak, whether native or originally planted, has been the subject of discussion, and it is difficult to give a definite verdict. Historically, this district was noted for its oak woods up to the comnig of the Parson's family, and it would not be surprising if they preserved some of the woods near their residence, especially on soils of little agricultural value. The surprising absence of beech and the presence of the rather rare *Mercurialis perennis* in quantity on the floor of the woods also suggest that the oak here may be native.

Unfortunately, the site is unfavourable to the production of very large oak in long rotation, although some of it is of medium size and good quality. There is an interesting example of oak regeneration on one area. Ash, too, suffers from lack of moisture, and, although very vigorous and in fact a weed in the early stages, it falls off markedly in growth rate in the pole stage. Evidently ash can only be worked on a short rotation.

Amongst the conifers, Japanese larch seems to withstand the unfavourable site conditions very well, and several thriving plantations were inspected in the thinning stage. Some successful natural regeneration from three older Japanese larch trees was also observed. Douglas, we were informed, goes into check in the thicket stage—

about the eighteenth year—but recovers well in a few years after the first thinning. Mr. Chisholm advocates heavy thinning as a remedial measure.

On moisture flats there were some fine Douglas, about 35 years old, and a specimen of Abies grandis of similar age must rank amongst the finest in the country. A few small groups of *Pinus insignis* were remarkably vigorous and appear to be deserving of wider use on this soil type. Corsican Pine was doing well, but Scots Pine and European Larch are rather disappointing. A Norway Spruce plantation, about 40 years old, was making slow progress, limited, no doubt, by water shortage.

When the circuit of the woods was completed the Earl and Countess of Rosse entertained members to tea at Birr Castle, and very kindly showed us over the castle with its many family portraits, antiques and period pieces. Of professional interest to foresters were the magnificent yew staircase and the remarkable panelling in elm with cherry insets, designed and prepared by Mr. Chisholm. Capt. Ryan expressed our sincere thanks to the Earl and Countess of Rosse for their magnificent hospitality and kindness.

Finally, our hosts showed us over the beautifully laid-out garden and the arboretum with its many rare specimen trees.

As darkness fell, members took leave of our hosts with renewed expressions of thanks for a most interesting and enjoyable day.

SOCIETY OF IRISH FORESTERS

LIST OF MEMBERS—NOVEMBER, 1949

Allman, David, Chair Hill, Bansha, Co. Tipperary.
Aldridge, Robert, Beauclerk, Mount Fallon, Ballina, Co. Mayo.
Almack, Thomas, Gilltown Stud, Kilcullen, Co. Kildare.
Ashtown, Lord, Woodlawn House, Co. Galway.
Ager, W. E., 88 Merrion Square, Dublin.
Blighe, Thomas, Castlemartyr P.O., Co. Cork.
Breslin, William J., Ballybofey, Co. Donegal.
Butler, Peter J., Johnstown Castle, Wexford.
Bland, William, Rath House, Portarlington, Laoighis.
Brunner, Miss Nora, 9 Upper Clanbrassil St., Dublin.
Buckley, John Lawrence, Rockwell College, Cashel, Co. Tipperary.
Blake, John Joseph, Ballyglunin, Co. Galway.
Bogue, Maurice, Timber Merchant, Drogheda.
Bayley, C. J., Woodenbridge, Wicklow.
Boyd-Rochfort, Mrs. Iris, Middleton Park, Castletowngeoghan, Co. Westmeath.
Bayley, E. A. T., Ballyarthur, Woodenbridge, Co. Wicklow.
Branigan, Laurence F., Beechmount, Mornington, Drogheda.
Beresford-Barret, H., Crocknaraw, Moyard, Co. Galway.
Barry, Thomas A., Experimental Station, Bord na Mona, Droichead Nua.
Barrett, Gerald P., Eastham House, Bettystown, Co. Meath.
Browne, Dominick Andrew Sidney, Breaghwy, Castlebar, Co. Mayo.
Chisholm, William Y., Oxmantown Mall, Birr, Offaly.
Clear, Thomas, Albert Agricultural College, Glasnevin, Dublin.
Crerand, Roderick J., Flower Hill, Navan.
Canning, John, Pettigo, Co. Donegal.
Clarke, Francis P., Ard Aluinn, Rathdrum, Co. Wicklow.
Cronin, Patrick, Emo Park, Portarlington, Laoighis.
Carr, Michael L., 11 Clare Road, Drumcondra, Dublin.
Crammond, Joseph A., Model School, Clonmel.
Cusack, William F., Dromore, Greenane, Killarney.
Curran, Cornelius, Ballymacarbery, Clonmel.
Collins, Timothy, Monivea, Athenry, Co. Galway.
Craig, Duncan K., 102-103 Grafton Street, Dublin.
Crozier, John, 62 St. Lawrence's Road, Clontarf, Dublin.
Cahill, Miss Sarah, 4 Mount Street Crescent, Dublin.
Cameron, Grigor John, Weatherhouse Haugh, Dowhill, Selkirk, Scotland
Connolly, Michael, 20 Shop Street, Drogheda.
Clear, Thomas, Killally House, Kilworth, Co. Cork.
Cormican, Anthony, Avondale, Rathdrum, Co. Wicklow.
Crichton, Mrs. Joan H., 5 Lansdowne Terrace, Dublin.
Crichton, Alex Cochrane, 5 Lansdowne Terrace, Dublin.
Cosgrave, Myles, c/o Callan P.O., Co. Kilkenny.
Dalton, Matthew, Baunreagh, Mountrath, Co. Leix.
Delaney, Patrick, Kilbeheny, Mitchelstown, Co. Cork.
Donovan, Timothy, Cairbre, Sutton, Co. Dublin.
Dungan, William, Woodford, Co. Galway.
Dooley, Michael E., Coolgreaney, Inch, Gorey, Co. Wexford.
Doyle, John P., Newtownmountkennedy, Co. Wicklow.
Darby, John J., 88 Merrion Square, Dublin.
Devereux, Nicholas, The Meetings, Avoca, Co. Wicklow.
Deasy, J. J., Avondale, Rathdrum, Co. Wicklow.
Diver, Neil, Forestry Office, Custom House, Galway.
Deegan, Michael, c/o I.L.C., Upper Merrion St., Dublin.
Dalgleish, T. W., Wallace Chambers, John Dickie St., Kilmarnock.
Delaney, Sean, Technical School, Prosperous, Co. Kildare.
Deeney, Vincent, 114 West Street, Drogheda

Dowling, Charles P., 64 Hillsboro Court, London, N.W.6.
Daly, E., 88 The Rise, Mount Merrion Park, Blackrock, Co. Dublin.
Egan, D. J., Cappoquin, Co. Waterford.
FitzPatrick, Hugh M., Kendalstown Hill, Delgany, Co. Wicklow.
Finnegan, Thomas, Gort, Co. Galway.
Forbes, A. C., Longleat, Killiney Road, Killiney.
Fahy, M. J., Avondale, Rathdrum, Co. Wicklow.
Gavigan, Hugh, c/o Mrs. Curtin, Henry Street, Kilrush, Co. Clare.
Galvin, James, Park Cottage, Wexford.
Grehan, S. A., Clonmeen, Banteer, Co. Cork.
Gray, Miss Winifred E., Noam, Thurles, Co. Tipperary.
Golden, Walter G., Hollymount, Claremorris, Co. Mayo.
Gladstone, J., Capenoch Estate Office, Penpont, Dumfriesshire.
Hayes, Denis G., Donadea, Co. Kildare.
Hannon, John, Ralish, Kilconly, Tuam, Co. Galway.
Haas, George, Forestry Office, Upper Mallow Street, Limerick.
Hanahoe, Anthony J., Bree Forest, Enniscorthy, Co. Wexford.
Healy, Peter, Clonegal, Co. Carlow.
Harte, Joseph P., Inistioge, Thomastown, Co. Kilkenny.
Henry, Mrs. A. H., 21 Clyde Road, Dublin.
Hamilton, John S., Brownhall, Ballintra, Co. Donegal.
Hendry, James M., Tiglin, Ashford, Co. Wicklow.
Hackett, Patrick J., c/o Beattie, Eastfield View, Eastfield, Dumfries, Scotland.
Hudner, Martin, Crow Hill, Cappoquin, Co. Waterford.
Hood, Edward, Dromore Castle, Kenmare, Co. Kerry.
Hamilton, Noel C., Lareen, Kinlough, Co. Leitrim.
Hughes, Miss Olivia H. A., Ann's Gift, Fethard, Co. Tipperary.
Inchiquin, Rt. Hon. Lord, Dromoland Castle, Newmarket-on-Fergus, Co Clare.
Johnston, W. J., Lansdowne Estate, Kenmare, Co. Kerry.
Jeffars, Thomas H., Ashfield Hall, Ballickmoyler, Carlow.
Johnston, Joseph, 36 Trinity College, Dublin.
Kelly, Thomas, Coolgreany House, Inch, Gorey, Co. Wexford.
Kerrigan, Patrick J., Annagh Bay, Hazelwood, Sligo.
Kearney, James C., Knock Eglan, Kilrossanty, Co. Waterford.
Kenny, Martin G., James St., Westport, Co. Mayo.
Keane, Mrs. Anne Rhodes, Liskeveen, Thurles, Co. Tipperary.
King, Mrs. A. L. Kathleen, Ard-na-Ree, Deerpark Road, Dundrum
Kennedy, Thomas, People's Park, Limerick.
Kelly, Michael A., 18 Gracepark Terrace, Drumcondra, Dublin.
Kelleher, John, Avondale, Rathdrum, Co. Wicklow.
Killean, J. J., 14 Gracepark Terrace, Drumcondra.
Legg Bros. (Teresa Connolly, Prop.), 10 Hill Street, Dublin.
Langley, Henry R., Archerstown, Thurles, Co. Tipperary.
Lowry, Albert L., Bachelor's Lodge, Navan, Co. Meath.
Lloyd, Hardress, Glasderrymore, Brosna, Offaly.
Leslie, Sir Shane, Glaslough, Co. Monaghan.
Lehane, Con., Leinster House, Dublin.
Moynihan, T., Scart, Ballylooby, Cahir.
Mooney, O. V., Hollybrook, Bray, Co. Wicklow.
Muir, G., Clonad, Killurine, Tullamore.
Murphy, F. J., Main Street, Ballybofey, Co. Donegal.
Meldrum, J. A. K., Director of Forestry, 88 Merrion Square, Dublin.
Magan, A. T. S., Killyon Manor, Hill-o'-Down, Co. Meath.
Mahon, Michael J., Woodford, Loughrea, Co. Galway.
Madden, Patrick, Lurganboy. Manorhamilton, Co. Leitrim.
Maher, James J., 88 Merrion Square, Dublin.
Murphy, Joseph, The Green, Stradbally, Leix.
Mangan, Dermot P., " Graigue," Richmond Ave., Milltown, Dublin.

Morris, Niall, 161 Howth Road, Clontarf, Dublin.
Morehead, Frederick T., Currabinny, Co. Cork.
Morrison, Alex, c/o McAinsh and Co., Touragh, Killarney.
Manni..g, Thomas, 88 Merrion Square, Dublin.
Morrissey, P. J., Avondale, Rathdrum, Co. Wicklow.
MacCarthy, Timothy H., 26 St. Patrick's Ave., Athy, Co. Kildare.
McGlynn, D., Forestry Office, Slaney Place, Enniscorthy.
McMahon, Felix, Wayside, Rathdrum, Co. Wicklow.
MacMenamin, Seamus, Dunmore, Durrow, Leix.
McCarthy, Timothy, Forestry Office, 5 West End, Mallow.
McGuire, Daniel, Clonminch, Tullamore.
McNeill, Norman, 21 St. Helen's Road, Booterstown, Dublin.
McNamara, Michael, Freshford, Co. Kilkenny.
McEvoy, Timothy, 104 Lr. Leeson Street, Dublin.
The McGillicuddy, Beaufort, Co. Kerry.
McBeill, William Martin, University of Aberdeen, Old Aberdeen, Scotland.
McDermott-Swan, Scott, Stonewold, Ballyshannon, Co. Donegal.
McCartan, Patrick J., Auburn, Athlone.
McCartan, Patrick, Cloncormack, Hollymount, Co. Mayo.
McMahon, Morgan, Dromore Castle, Kildimo, Co. Limerick.
McGoldrick, P. J., Thornton Lodge, The Curragh, Co. Kildare.
MacLysaght, Edward, Raheen, Tuamgraney, Co. Clare.
McGerty, John K., 30 Sandford Road, Ranelagh.
McGuire, Patrick, Annacrivy, Enniskerry.
Murphy, Thomas, Avondale, Rathdrum, Co. Wicklow.
Nally, William F., 62 Merton Drive, Ranelagh, Dublin.
O'Beirne, Michael, Avondale, Rathdrum, Co. Wicklow.
O'Leary, John, Green Road, Portlaoighise.
O'Sullivan, S. M., 88 Merrion Square, Dublin.
O'Carroll, Thomas, Avondale, Rathdrum, Co. Wicklow.
O'Neill, Thomas, Clash, Rathdrum, Co. Wicklow.
O'Carroll, Joseph, Forestry Office, Tyn-y-Crom, Rathdrum, Co. Wicklow
O hAragain, D., Kinnitty, Offaly.
O'Grady, Peter P., Mucklagh, Ballinglen, Co. Wicklow.
O'Lundy, Art, Corofin, Ballyglunin, Co. Galway.
O'Searcaigh, M., c/o Power's, Nurserymen, Waterford.
O'Doherty, G. H., Kilrush, Co. Clare.
O'Shea, Michael D., 7-8 Main Street, Killarney.
O'Brien Corkery, Daniel, Kenmare, Co. Kerry.
O'Rahilly, Aodhogan, Moreen, Clondalkin, Co. Dublin.
More O'Ferrall, Roderic, Kildangan, Co. Kildare.
O'Sullivan, Denis M., 8 Woodstock Gardens, Ranelagh, Dublin.
O'Donovan, Con., 50 Iona Crescent, Glasnevin, Dublin.
O'Broin, Sean D., 33 Merrion Square, Dublin.
O'Sullivan, Thomas, 47 Belgrave Square, Rathmines, Dublin.
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