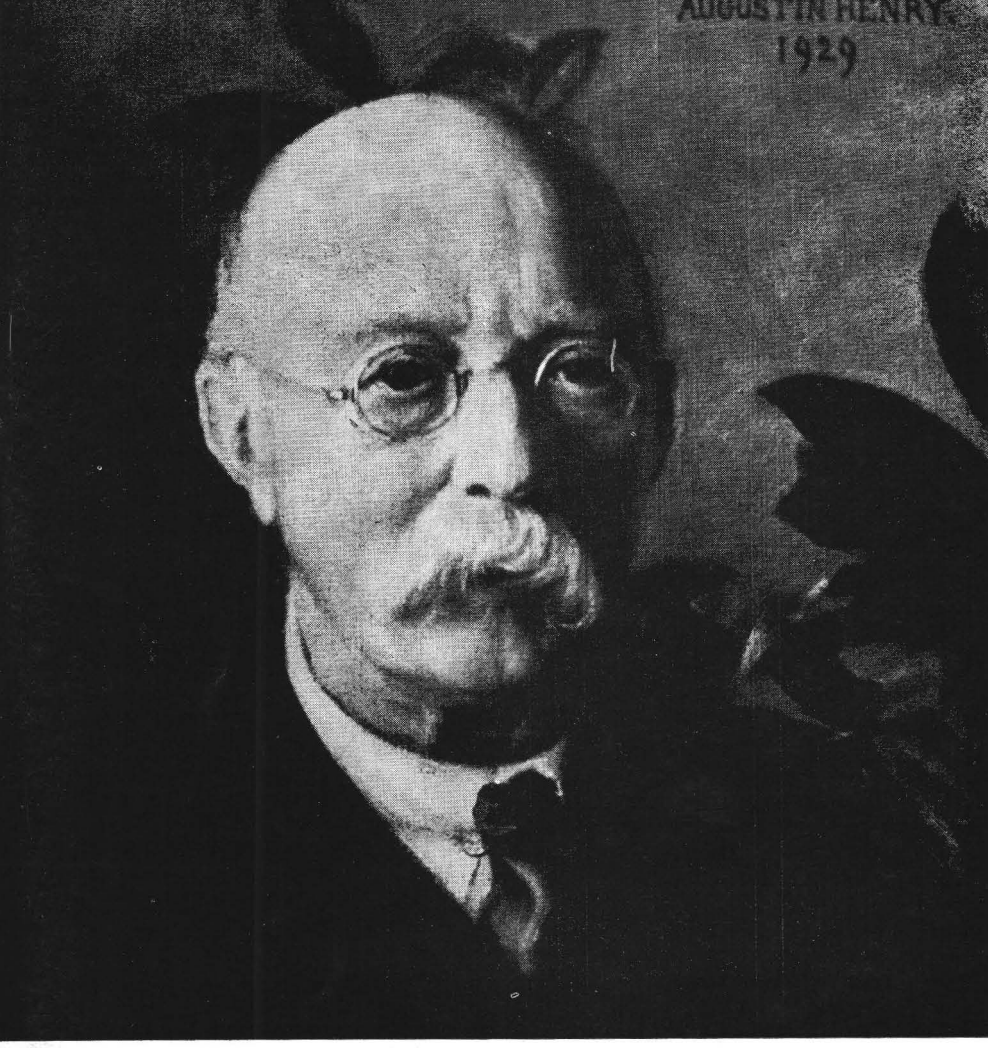


IRISH FORESTRY

Journal of the Society of Irish Foresters

Published Twice Yearly

Vol. 30 No. 1 1973 50p

BOWATER BOARD IS GOING PLACES

At the Bowater factory in Athy, advanced techniques and equipment are used to make high quality hardboard products which are increasingly in demand on export markets. Two-thirds of Bowaters entire production is exported annually (Bowater exports during the first nine months of last year promoted Ireland to fourth place in the list of Britain's hardboard suppliers).

Bowaters are big *consumers*, too. They are among the largest users of timber—1,000 tons a week—and electricity in the country.

Bowater Boards are recognised by architects, engineers and builders as an important construction material. They are used in homes and shops, in factories and on farms throughout Ireland. Their exceptional versatility gives them great potential for exciting new applications in contemporary building and design.

Bowater Boards are going places—and giving a boost to the growth of Ireland's economy on the way!

Bowater Irish Board Mills
Limited, Athy, Co. Kildare.
Tel. Athy 21280.
Telex: Dublin 5368.

BONSER ROUGH TERRAIN TRUCKS

THE FORK TRUCKS FOR TIMBER HANDLING AND BUILDING SITES AND ALL ROUGH TERRAIN WORK

LEYLAND TRACTORS

SEE OUR RANGE OF 2 AND 4 WHEEL DRIVE HEAVY DUTY LEYLAND 45 AND 100 H.P. 6 CYLINDER INDUSTRIAL TRACTORS WITH HEAVY DUTY LOADERS, WINCHES, ETC.

ALSO

Fisher Humphries Hedge Cutters

AT . . . . . **SOLE IMPORTERS**

MAHON & McPHILIPS LTD.
KILKENNY

TELEPHONE KILKENNY 21920 (8 LINES)
TELEX 8765

CONSERVATION

To provide the power which is essential to our civilisation power stations must be built, transmission lines must be erected, rivers must be harnessed.
In doing these things the E.S.B. keeps the environment constantly in mind. Care is taken to restore areas which have been disturbed. New amenities and new beauty are created, new lakes are formed.
Landscaping, tree and flower planting at E.S.B. stations, rearing and planting out young salmon and trout in rivers and lakes — these are just some of the ways in which the E.S.B. conserves and improves the environment for the people whom it serves.

You can depend on

DANARM

the greatest name in CHAIN SAWS

The Award Winner

- For tree felling, from the softest to the hardest of woods. And the biggest trees.
- For tree surgery
- For land clearance
- For limbing out and snedding
- For cross-cutting and logging
- For fencing
- For hedge cutting

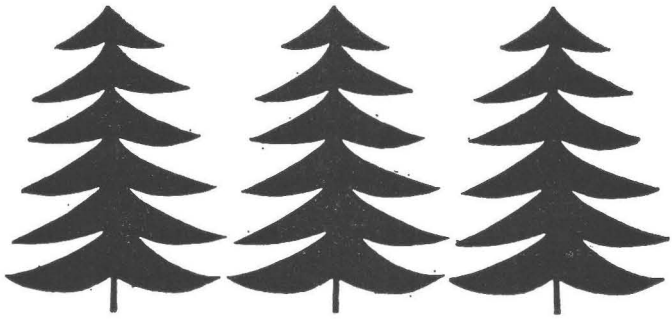
Five first rate models to choose from. 55cc to 125cc. Cutter bars from 12" to 32". Tough, fast-working, simple to maintain. And all backed by the superb DANARM service. Prices from £79. **See them for yourself. Literature free on request.**

Lenehans

STOCK IT!

Open until 5.30 p.m. from Mon. to Sat.

Thomas Lenehan & Co. Ltd
124 Capel Street, Dublin 1
Rathmines Branch:
7, 8, 9 Rathgar Rd., Dublin 6



Control weeds in forestry plantations

. . . . . **with 'Gramoxone'. 'Gramoxone' contains paraquat which is potentially the most useful weedkiller for forestry. It kills all green growth and is particularly effective against grasses.**

'Gramoxone' can be used for: Cleaning seed beds and transplant lines; Chemical screefing of land prior to planting; Ring weeding of young trees after planting; Dessication of firebreaks for controlled burning; Total weed control in uncropped areas.

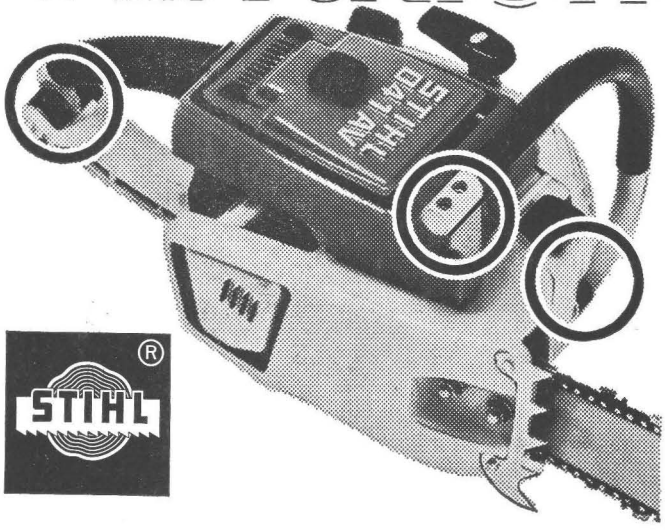
ICI **'GRAMOXONE'**

A PLANT PROTECTION PRODUCT FROM
I.C.I. (Ireland) Ltd., 35 Sth. Frederick St., Dublin 2

STIHL 041 AV

World's first and only Chain Saw with built-in Shock Absorbers to eliminate

vibration



STIHL®

LIGHT AND POWERFUL

Distributed by :

LIFFEY DISTRIBUTORS
LIMITED

52 Iona Crescent - Glasnevin - Dublin 9

Telephone 306479-306888

IRISH FORESTRY

CONTENTS

(Authors alone are responsible for views expressed)

Society of Irish Foresters

President:
W. H. JACK, 37 Bladon Drive, Belfast 9.

Vice-President:
T. CLEAR, 2 Taney Crescent, Dundrum, Dublin 14.

Secretary:
P. CLINCH, c/o Royal Dublin Society, Ball's Bridge, Dublin 4.

Treasurer:
F. MULLOY, *Site* 14 Rochestown Ave., Dun Laoghaire, Co. Dublin.

Editor:
N. O'CARROLL, 12 Mapas Road, Dalkey, Co. Dublin.

Business Editor:
M. SHARKEY, "Kylemore", Hyde Park Avenue, Blackrock, Co. Dublin.

Hon. Auditor:
D. MCGLYNN, 88 Priory Avenue, Blackrock, Co. Dublin.

Technical Councillors:
G. HIPWELL, Forestry Office, Emo, Portlaois, Co. Laois.
T. V. O'BRIEN, Main Street, Kingscourt, Co. Cavan.
J. J. PRIOR, Greenville, Portarlington, Co. Laois.
W. G. DALLAS, c/o Tara Exploration Ltd., Navan, Co. Meath.
E. JOYCE, Ballydowling, Glenealy, Co. Wicklow.
J. MACKIN, c/o Killeter Forest, Castlederg, Co. Tyrone.

Associate Councillors:
MISS E. FURLONG, "Silverne", 150 Clontarf Road, Dublin 3.
C. B. TOTTENHAM, Ballycurry House, Ashford, Co. Wicklow.

Northern Regional Delegate:
D. A. DICKSON, 35 Knockfergus Park, Greenisland, Co. Antrim.

IRISH FORESTRY

Volume 30 1973 No. 1

Editorial

The media and us

I suppose foresters may take some consolation from the fact that the spate of recent writing about our agricultural potential in the EEC will at least marginally increase the consumption of wood pulp. Doubtless the use of paper wrapping in the presentation of the merchandise will also be envisaged.

This is poor enough comfort.

The sheer brainwashing effect which the prospect of apparently unlimited goodies has on the agricultural lobby can be seen in the following example. Last February the agricultural correspondent of a daily paper took up the story of the use of helicopters by the Forest and Wildlife Service of the Department of Lands for the fertiliser treatment of forest crops. In a farming supplement in the same paper in March this has become "the work being carried out by the Department of Lands on aerial fertilisation. This involved the use of helicopters to spread fertilisers on land . . . where output of grass and vegetation can be dramatically boosted to carry vastly increased stocking rates". (No mention of forestry or trees).

Writing in the same supplement on "The potential of hill and marginal land", a prominent agricultural research manager classifies such land into five categories. He deals in some detail with one, the dry mineral hills, which he sees as having the greatest agricultural potential; cursorily with another, the shallow peats; and of a third, deep peat, he says that beef production is "technically feasible", a phrase which usually means that something is just not on. We are thus left with the impression that all marginal land has great agricultural potential, although no consideration at all has been given to one of the five categories, the drumlin soils of the North and North-west Midlands. Such are the subtle methods which must be met and countered.

What is conspiciously absent, though, from all these dithyrambic fantasies, is any attempt to reconcile their message with the Mansholt proposal of 1968 to remove at least 5 million hectares from agricultural use in the EEC countries over a period of ten years.

Rural Land Use and the Balance of Payments[1]

FRANK J. CONVERY[2]

Balance of payment restrictions have long been recognized as important factors limiting Irish economic growth. It is germane then for agriculturalists and foresters to assess the impact on the balance of payments when change in land use is being contemplated. A study recently completed (Convery, 1972) compared forestry and agriculture as uses on the lowland drumlin soils of County Leitrim for a number of variables, including the likely effect of the two uses on the nation's balance of payments.[3] The discussion which follows treats this latter topic.[4]

PROCEDURE

Agriculture

Because 75 per cent of Leitrim's sheep population is found in the mountainous northern portion of the county (Duke, 1967, p. 39) it was assumed that the cattle population was confined to the lowland drumlin soils. The county was divided according to stocking density and soil type, as suggested by Lee and Diamond (1969). Their classification showed 250 thousand acres of lowland drumlin soils, with an average stocking density of 25-27 livestock

---

1. This research was made possible by a Doctoral Dissertation Fellowship from Resources for the Future. Inc., Washington, D.C., with some financial and secretarial assistance from An Foras Talúntais and An Foras Forbartha respectively. This support is gratefully acknowledged.

2. Assistant Professor of Forest Resource Economics, School of Forestry, Duke University, Durham, N. Carolina, 27706.

3. It is not suggested that this particular criterion is of overriding importance, but to the extent that it differs with land use it has significance for policy makers, for the same reason that the IDA evaluates the exporting (or import saving) potential of prospective industrial investors.

4. Professor R. O'Connor (ESRI) in commenting on this paper has suggested that it would make more sense to examine this aspect of land-use at the national rather than the regional level. While this is undoubtedly true, the possibility is precluded since estimates of potential physical forest output on all Irish soil types are not yet available. However, the results are presented per unit of physical output, so that in the event of nation-wide physical estimates becoming available, the extention of the results to the national level would be a simple matter.

units[5] per 100 acres. One thousand acres was chosen as the study unit, hereafter referred to as a "land unit."

It was assumed that the present grassland cattle-grazing system of farming would be continued in the future. Two output levels were hypothesized. In the first case it was assumed that annual output would be maintained at present (1969) levels. In the second case it was assumed that over the next 30 years output would double in response to the much higher price levels anticipated on entry to the EEC (Sheehy, 1969, p. 12), achieving the physical grazing capacity of 50 livestock units per 100 acres cited by Lee and Diamond (1969).

Figures for annual agricultural output are not available in Ireland at the county level, so that the national figures had to be disaggregated. For livestock outputs, county livestock numbers were used as the principal allocator, and outputs were distributed among the various outlets in the same proportions as the national output. This could be justified because the structure of the cattle herds as to age and composition in Ireland and Leitrim were found to be very similar. Average per cow county milk yield[6] (300 gals.) multiplied by number of milk cows yielded an estimate of annual milk production, and this likewise was distributed among outlets in the same proportions as national output. Cattle and milk outputs per land unit are displayed in Table 2.

It was assumed that all of agricultural output was either import saving or export earning, and therefore that the value of gross output net of imported inputs could be regarded as contributing positively to the balance of payments. When livestock output was exported without further processing (live exports) it was valued at "farm gate" prices (CSO, 1970a, p. 96). When the output was processed (milk processing and slaughtering), the gross output of the processing sectors was assumed to be "induced" by the farm outputs. For milk processing and slaughtering, over 80 per cent of their raw materials comes from the farming sector; it was reasonable to assume that these industries would not exist without a flow of domestically produced raw material. Thus the gross out-

---

5. A dairy cow of $10\frac{1}{2}$ cwt. is taken as a basic grazing livestock unit. All other grazing stock are given equivalents.

6. This per cow milk yield is very low compared to the national (1969) average of 527 gals per cow. However, Duke (1967, p. 36) found that in 1965 only 190 gals/cow on the average were delivered to creameries, so that an average of 300 gals/cow does not seem unreasonable. Milk output for Leitrim was valued using this method at 868,000 pounds in 1965. Using more detailed data and more sophisticated methods, Ross (1970, p. 42) arrived at an estimate of 754,000 pounds, so that perhaps some over-estimation is involved in this present study.

put of these two sectors was "attributed" to the milk and cattle farm outputs. These outputs were derived for 1969 using the Census of Industrial Production (CSO, 1971a, p. 203; CSO, 1971b, p. 266). In the case of slaughtering, the value of gross output attributable to beef was estimated by multiplying the total gross output by the proportion by value which cattle comprised of total livestock inputs (86 per cent in 1969). Dividing this figure by total number of cattle inputs yielded an estimate of average gross revenue generated per cow input (Table 1). For milk processing, the output value of eggs was deducted from gross revenue, the remainder being attributable to milk. This residual was then divided by the whole milk input to yield a gross output per unit milk input figure (Table 1).

TABLE 1

GROSS OUTPUT PER UNIT INPUT, BY TYPE, IRELAND 1969

Activity	Gross[7] Output £	Input nos.	Output/Input £
Slaughtering	53,982,516	560,276[8]	96·34
Milk Processing[9]	86,807,946	000s gals 658,652	133·5

Sources: CSO (1971a, p. 203), CSO (1971b, p. 266).

Applying the output per unit input figures of Table 1 to farm output per land unit yielded the value of total gross output induced for the two production levels.

Using an input-output table, O'Connor and Breslin (1968, p. 12) estimated the import requirements (direct and indirect) per dollar of final demand for various agricultural sectors in 1964. These requirements were deducted from gross output to yield an

7. Attributable to cattle and milk, as explained in the text.
8. Derived by dividing expenditure on cattle inputs by average per unit cattle price.
9. Includes milk "processed" for liquid consumption.

TABLE 2

VALUE OF ANNUAL GROSS OUTPUT "INDUCED" BY FARM OUTPUTS, PER LAND UNIT 1970-2000+. CONSTANT (1970 PRICES

Level 1

Activity	1970		1980	
Cattle	Nos.	Value (£)	Nos	Value[10] (£)
Live (exports)	38	2,736[11]	38	4,788
Dead Meat[12]	57	5,491	57	9,610
Milk				
	gals.		gals.	
Processed	32,271	4,308	32,271	6,462
Fed to livestock[13]	5,571	368		552
Total		12,903		21,412

Level 2[14]

Activity	1970		1980		1990		2000	
Cattle	Nos.	Value (£)	Nos.	Value (£)	Nos.	Value (£)	Nos.	Value (£)
Live (exports)	38	2,736	51	6,426	63	7,938	76	9,576
Dead Meat	57	5,491	76	12,814	95	16,017	114	19,220
Milk								
	gals.		gals.		gals.		gals.	
Processed	32,271	4,308	44,707	8,951	57,182	11,451	70,035	14,025
Fed to livestock	5,571	368	5,571	552	5,571	552	5,571	552
Total		12,903		28,743		35,958		43,373

Sources: CSO (1970, pp. 92 and 96); Table 1.

10. Incorporates a price rise of 50 percent in milk and 75 percent in beef, as anticipated by Sheehy (1969, p. 12). It was assumed that value of gross output would increase in like proportion.

11. Gross value was computed using an average per cow value of 72·0 pounds, derived from Table 7, CSO (1970, p. 96).

12. Includes exports and domestic slaughtering, the latter being valued as dea meat exports.

13. Gross value was computed by using the average price of milk used in farmers' butter (66·1 pounds per 1,000 gals.) derived from Tables 1 and 8, CSO (1970, pp. 93, 96). It was assumed that all of the increase in milk production anticipated in level 2 would be processed.

14. Because of the social, institutional and technological difficulties involved, the doubling of output was assumed to take place over 30 years, with one-third of the increase occurring every decade.

estimate of net contribution to the balance of payments for each sector (Table 3).

FORESTRY

From studies by O'Flanagan and Bulfin (1970) and Dillon (1970) it was estimated that the lowland drumlin soils would

TABLE 3

NET CONTRIBUTION OF AGRICULTURE TO THE BALANCE OF PAYMENTS, PER LAND UNIT, 1970-2000+. CONSTANT (1970) PRICES

Level 1

Sector	Import Requirements per pound of Final Demand	1970		1980	
		Gross	Net	Gross	Net
Cattle		£	£	£	£
Live (exports)	0·144	2,736	2,342	4,788	4,099
Dead Meat	0·148	5,491	4,678	9,610	8,189
Milk					
Processed	0·117	4,308	3,545	6,462	5,318
Fed to livestock	0·104	368	330	552	495
Total		12,904	10,895	21,413	18,101

Level 2

	1970		1980		1990		2000+	
Cattle	Gross £	Net £	Gross £	Net £	Gross £	Net £	Gross £	Net £
Live (exports)	2,736	2,342	6,426	5,501	7,938	6,795	9,576	8,197
Deat Meat	5,491	4,678	12,314	10,492	16,017	16,346	19,220	16,375
Milk								
Processed	4,308	3,545	8,951	7,367	11,451	9,424	14,024	11,542
Fed to livestock	368	330	552	495	552	495	552	459
Total	12,904	10,895	28,743	23,855	35,958	30,360	43,373	36,609

Sources: Table 2; O'Connor and Breslin (1968, p. 12)

support a Sitka Spruce crop with a mean yield class of 24.[15] It was assumed that a monocultural silviculture would be practised, with thinning beginning after 15 years and continuing periodically every 5 years thereafter to final clear-felling at 45 years. Thus the planning horizon under consideration extended from 1970 to 2015. It was also assumed that all output up to 7 inches top diameter would go to the sawmilling industry, with the remainder being absorbed by pulp and board manufacturers. Applying Forest Management Tables (Bradley *et al*, 1966, p. 91) yielded the wood outputs per land unit displayed in Table 4.

It was assumed that the pulp board and sawmilling plants would not exist without a flow of domestically produced raw material, and that therefore the gross outputs of these sectors could be "attributed" to the forestry sector. As in the case of agriculture, the simplifying assumption was made that all of the induced output was either import saving or export earning. Support for this assumption was derived from the fact that the pulpwood-using industries supply most of the domestic demand for particle board and hardboard, and export 60 per cent of their output. Most of any increase in output is likely to be exported. The Irish sawmilling industry presently supplies less than 10 per cent of total domestic consumption of sawn timber, so that additional production is likely to replace imports.

Classifying all of timber output as export earning (or import saving) is less defensible for wood products than it is for food. There are domestically produced substitutes for structural (lumber, chipboard, hardboard) and packaging (paper) wood products, such as cement, steel and plastics. Presumably part of any potential "decrease" in wood output could be met by an expansion in the output of these materials, rather than by imports. However, lumber and chemical pulp imports have increased by 33 and 43 per cent respectively from 1965 to 1969 (CSO, 1970b, p. 15, CSO, 1967, p. 157), which implies that substitutes, for whatever reason, cannot competitively fill the void. The assumption of a 100 per cent contribution to the balance of payments is probably not then a great distortion from reality.

The Census of Industrial Production's "Manufacturers of Wood" (CSO, 1971b) does not distinguish sufficiently among types of wood inputs, and in addition domestic and imported wood inputs are not differentiated, so that questionnaires had to be sent to the firms involved.

With 3 of the largest sawmills and 3 of the 4 pulpwood using plants in the country responding, the value of gross output per

15. Yield class for a particular species and site measures the maximum average annual volume increment per hectare in cubic metres. (Yield class 24 (metric) is equivalent to yield class 260 (Hoppus).)

TABLE 4

OUTPUT AND NET ANNUAL BALANCE OF PAYMENTS EFFECT FROM A LAND UNIT OF SITKA SPRUCE (YIELD CLASS 24 (260)[16]) BY OUTLET

Age	Output				Total Net Balance of Payments Effect (Annual)
	Pulpwood		Sawlogs		
	Output[16] (Periodic)	Net Balance of Payments Effect (Annual)	Output[16] (Periodic)	Net Balance of Payments Effect (Annual)	
	000s	£	000s	£	£
15	15 (408)	43,788			43,788
20	28 (780)	83,304			83,304
25	24 (673)	72,090	4 (107)	9,240	81,330
30	18 (503)	53,934	10 (277)	24,200	78,134
35	10 (284)	30,438	18 (496)	43,560	73,998
40	5 (146)	15,486	23 (634)	55,880	71,366
45	9 (250)	26,700	182 (5,050)	444,400	471,100

Source: R. T. Bradley *et al.* (1966, p. 91).

16. All output data have been converted to cubic metres from Yield Class 260 (Hoppus). Hoppus equivalents are given in brackets.

1,000 cubic metres of wood input was estimated as an average of £18,528 for pulpwood and £15,255 for sawlogs. Unfortunately estimates of total (direct and indirect) import requirements per dollar of final demand have not been computed for the forestery sectors. From the questionnaire responses it was estimated that inputs in the form of chemicals, emulsions, glue, etc., amounting to approximately 10 per cent of gross output were imported by the pulpwood-using firms, with a somewhat lower figure applying to the sawmilling sector. Considering that virtually all capital equipment must also be imported, and that there is an unaccounted for "indirect" importing effect, it was suggested that 20 per cent of gross output be "attributed" to imports. Making this deduction yielded a net effect on the balance of payments per 1,000 cubic metres of wood output of £14,811 for the pulpwood-using industry and £12,204 for the sawmilling sector. The net impact of forestry on the balance of payments was then calculated (Table 4). The effect of transferring a land unit from agriculture to forestry could then be estimated by difference (Table 5 and Figure 1).

TABLE 5

ANNUAL IMPACT ON THE BALANCE OF PAYMENTS OF TRANSFERRING A LAND UNIT FROM AGRICULTURE TO FORESTRY, 1970-2015

	Level 1	Level 2
	£	£
1970	—10,895	—10,895
1980	—18,101	—23,855
1985	25,687	19,933
1990	65,203	52,944
1995	63,229	50,972
2000	60,033	41,525
2005	55,897	37,389
2010	53,265	34,757
2015	452,999	434,491

Sources: Table 3 and 4.

COMPARISON AND CONCLUSIONS

In order to help clarify the issues that arise as a result of the different time paths displayed above, the concept of rate of time preference was introduced. A society's rate of time preference measures the rate at which it discounts future values in its decisions about current versus future "consumption." If present

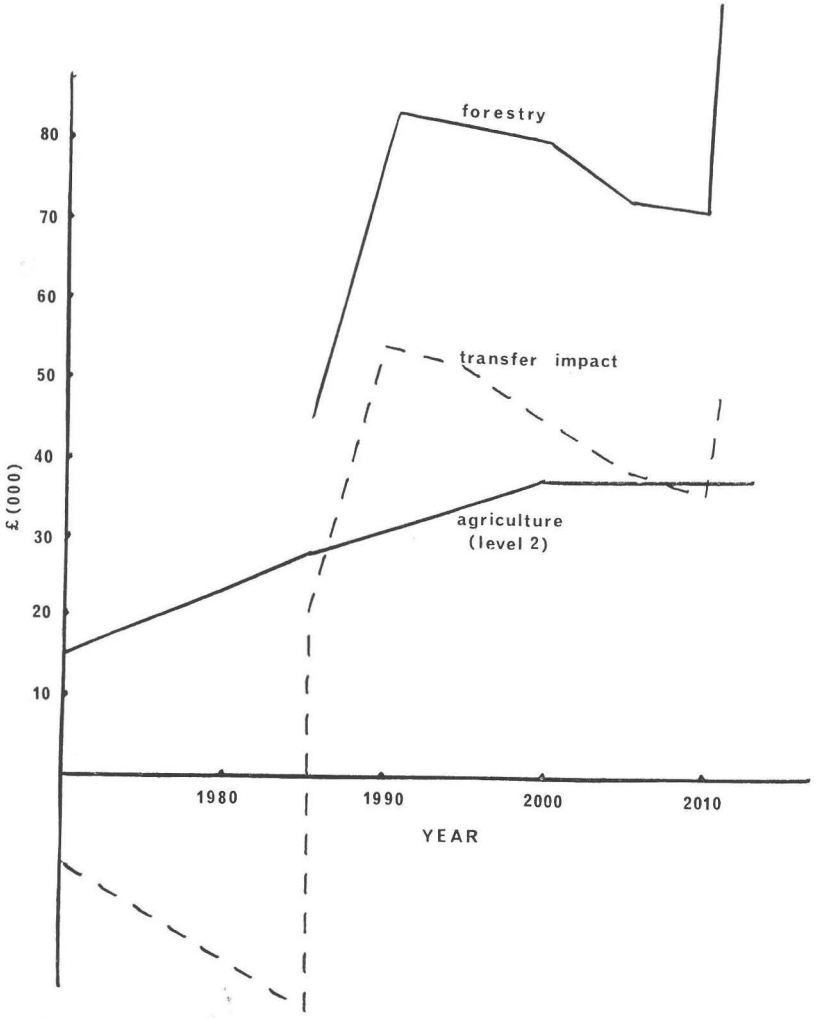


FIGURE 1. Annual impact of forestry and agriculture (level 2) on the Balance of Payments, and the impact of transferring from agriculture to forestry, per land unit, 1970-2015.

values are very heavily weighted relative to future flows, then the discount rate will be correspondingly high and *vice-versa*. Discounting rates of 14.0 and 12.5 per cent equated the discounted values of forestry and agricultural production levels 1 and 2 re-

spectively. Rates higher than these equating values will result in higher discounted values for agriculture; lower rates will "favour" forestry. It is clear then that even when future values are heavily discounted, forestry has the advantage as a generator of foreign earnings per land unit on lowland drumlin soils. This results because the land is very productive for wood production, but relatively much less so for forage production, and because the value added in processing for wood is high relative to grassland products; for example very little value is added to milk enroute from farm to liquid consumption (final demand) while 20-25 per cent of farm output flows unprocessed from farm to final demand in the form of live exports.

These processing conditions are unlikely to remain in the fixed proportions assumed in this discussion. Indeed a *caveat* should perhaps be entered at this stage concerning the labyrinth of assumptions both explicit and implicit that have been made throughout. By and large they have been necessitated by the fact that reliable predictions extending 45 years into the future were not available. Consequently the results are only valid to the extent that they measure relative performance if presently identifiable or hypothesized trends are fulfilled. Within this framework we can observe that a cubic metre of pulpwood makes a larger contribution to the balance of payments than a cubic metre of sawlog material. Encouragement here perhaps for Western forestry; certainly the finding has some implication for forest policy.

Since investment funds rather than land are often the scarcest resource, it may at times be more useful to estimate balance of payments contribution per pound invested rather than per land unit. Capital requirements for forestery and agriculture (level 2) were about the same (£71.0 and £68.1 per acre respectively) while constant production agriculture was much less capital intensive at £24.3 per acre.[17] When balance of payment contribution was discounted at interest rates from 5 to 9 per cent, and then expressed per pound of capital invested, the following picture resulted (Table 6).

Using this criterion, constant production agriculture would be the preferred use at discount rates above 6 per cent. This results from the fact that this use generates a relatively high output without "locking up" much capital. Having by now quite confused the reader, without even introducing the more traditional (and complicated) concerns of internal rate of return, income and employment generated, etc., it is perhaps time to bring this discussion to a close, falling back on the economists' oft spoken last line of defence; some information, however tentatively it must be accepted, is better than no information at all.

17. See Convery (1972, p. 96 and Appendix B) for the derivation of these figures.

TABLE 6

DISCOUNTED BALANCE OF PAYMENTS CONTRIBUTION PER POUND OF CAPITAL INVESTED. CONSTANT (1970) PRICES

	Agriculture				Forestry	
	Level 1		Level 2			
Discount Rate	Total	Per £ Invested/Ac	Total	Per £ Invested/Ac	Total	Per £ Invested/Ac
0·05	266·1	10·9	397·8	5·8	852·1	12·0
0·06	226·7	9·3	330·7	4·8	637·4	8·9
0·07	195·7	8·1	278·2	4·1	483·4	6·8
0·09	150·7	6·2	203·6	3·0	288·9	4·1

REFERENCES

Bradley, R. T., Christie, J. M., and Johnston, D. R. (1966). "Forest Management Tables", *Forestry Commission Booklet No. 16*, HMSO.

CSO (1967). *Statistical Abstract of Ireland*, Government Publications, Dublin.

CSO (1970a). *Irish Statistical Bulletin* 45(2), June.

CSO (1970b). *Irish Statistical Bulletin* 45(1), March 1970.

CSO (1971a). *Irish Statistical Bulletin* 46(3), September.

CSO (1971b). *Irish Statistical Bulletin* 46(4), December.

Convery, Frank J. (1972). "Impacts of Alternative Rural Land Uses: A Case Study" Unpublished Ph.D. dissertation, Dept. of Forestry Economics, State University College of Forestry at Syracuse University.

Dillon, J. (1970). "A Study of the Sociological and Technological Aspects of Afforestation on Drumlin Soils" Presented for the Master of Agricultural Science Degree, University College, Dublin.

Duke, S. (1967). *County Leitrim Draft Economic Development Survey*. Dublin: Department of Finance.

Lee, J., and Diamond, S. (1969). "What is the Grazing Capacity of Irish Soils?" *Farm Research News* 10(4), July.

O'Connor, R., and Breslin, M. (1968). "An Input-Output Analysis of the Agricultural Sector of the Irish Economy in 1964." *Paper No. 45*. Dublin: Economic and Social Research Institute.

O'Flanagan, L. P., and Bulfin, M. (1970). "Spruce Growth Rates on Drumlin Soils." *Irish Forestry* 27(1).

Ross, M. (1970). "The Methodology of County Income Estimate" —Revised Draft. Dublin: The Economic and Social Research Institute.

Sheehy, S. J. (1969). *EEC; Policy Implications for Irish Agriculture*. Dublin: Department of Applied Agricultural Economics, University College.

Diversity and Irish Forestry Policy

BY FRANK J CONVERY*

The purpose in this paper is to stimulate some thought on the role which forestry might play in the social and economic life of Ireland in the future, say 50 years from now; a consideration of what our objectives should be and how they might be achieved will be used as the means of cerebral stimulation.

Demand for both wood and outdoor recreation is very income elastic i.e. as *per capita* real incomes increase, people tend to spend an increasing fraction of that increase on forest products (lumber, pulp, paper, hiking, orienteering, etc.). We can observe this phenomenon in Ireland, where for example, lumber imports have increased (in terms of quantity) by 33 percent from 1964 to 1968 (CSO, 1966 p. 157; CSO, 1970 p. 15).

As we anticipate a growing economy and perhaps also a growing population in the years ahead, we can expect an accelerating rate of increase in wood based imports, becoming an increasingly burdensome element in our balance of payments deficit.

We know that forestry, through its strong forward linkage generates much income and employment off the land. In the highly integrated U.S. economy typically 10 percent or less of wood based employment is comprised of forest workers (Moak, 1971, p. 10).

Further, we know that much of the income and employment generated by forests is located in rural areas, because forest industries are resource based.

These are good reasons for society to invest in forests, but there is another, namely *diversity;* forests can add another prop to what has traditionally been a very unstable Irish rural economy. It is a well known principle in ecology that diversity adds stability to any biological system. It is no less true where economic systems are concerned: the economy of Washington State in the U.S. for example has been devastated by the slow-down at the Boeing Corporation's plant in Seattle, and we are all familiar with less spectacular examples in Ireland. Where an economy is based on a biological system lacking diversity and therefore stability, the economy will obviously be likewise unstable. Examples abound. The cotton industry in the Southern U.S., on which the region's

* Assistant Professor of Natural Resource Economics, Duke University School of Forestry, Durham, North Carolina, U.S.A.

prosperity was based was virtually eliminated in the 1930's by the boll weevil, and the regional economy has begun to show signs of strong recovery only in the past 10 years; coincidentally enough, this recovery has been achieved on the shoulders of a dynamic pulp and paper industry. We are of course familiar with the tragic role played by a potato dependent economy in Irish history.

Looking to the future now we can I think anticipate that laws of comparative advantage in a European context will continue to nudge Irish farming in the direction of milk and beef; this in turn will leave the Irish rural economy very susceptible to destabilization in the event say of a foot and mouth disease epidemic, or other perhaps unknown pathogen. Forestry, with its very flexible production functions (you can vary inputs and outputs as to quantity, type and composition over a wide range) can provide a useful social mechanism to dampen cyclical tendencies in a single commodity rural economy.

As already mentioned, outdoor recreation is a very income elastic good, and the types of recreation provided in forests add greatly to the diversity of offerings in this area by the tourist industry; again a stabilizing factor in a rural economy where certain types of outdoor recreation e.g. salmon fishing are susceptible to disease or faddish changes of taste.

We have up to this point avoided the chief obstacle to fulfilling these rosy expectations for forestry, namely the time lag involved (ranging usually from 20-50 years) to achieve these effects which because time is money makes forestry also quite a capital intensive operation in a country where capital is scarce.

Notwithstanding this problem, successive governments have understaken substantial and sustained investments in afforestation: Why was this so?

First of all the favourable points listed above were doubtless recognised and forestry was correctly if vaguely perceived as being a "good thing". More important than this perhaps was the fact that an interest group developed in the form of the Forest and Wildlife Service, which had a stake of sorts in the expansion of the forest area. The Forest and Wildlife Service, no less than other government agencies, is not proof against Parkinson's Law and "has expanded to fill the available space". (Perusal of the offices in Merrion Street will show that even space which was not available has also been filled!).

This expansion could continue almost of its own momentum because there were not any significant countervailing forces in its path. The urbanites favoured forestry in a vague romantic sort of way, and because afforestation efforts have been largely confined

to marginal agricultural land, the rural community, if less enthusiastic, saw no reason to oppose it. Forestry then for the past 40 years has been, as the Americans would say, like "motherhood and apple pie"; it was not opposed by any significant political power block or national interest group.

What of the future? If we accept that further investment of resources in forestry would be of net benefit to our society, can we be sure that the expansion of State Forests will continue as it has in the past?

I am inclined to think not. Entry into the EEC has already had a dramatic impact on rural land prices in Ireland, and even if we accept that the present agricultural price structure is unlikely to be maintained, this upward movement in land prices is likely to continue as more and more of our land area is purchased for "amenity" or simply speculative purposes. As land values move upward, intervention by the Forest and Wildlife Service in the market, even for previously sub-marginal agricultural land, will arouse resentment as farmers try to expand their own holdings. At the other end budgetary considerations will make an annual rate of expansion of 10,000 hectares increasingly difficult to maintain. Thus if my analysis is correct we can anticipate for the first time a strong and politically potent force (farmers) developing in opposition to State forest expansion, and that sooner or later this influence will be reflected politically in a slowing down of the afforestation program.

What strategies are available to us to maintain forestry's momentum?

The first one which comes to mind is to broaden the political base, to give more citizens and groups beyond civil servants and the forest industries a direct stake in forestry and its outputs. The opening up of the forests to the public for recreation a few years ago, whether consciously or not could be regarded in part as an attempt to convert some of the urban community to the merits of forestry.

Something more will be required. What I have in mind is a partnership between the public and private sectors to expand the forest area. I am aware that there exists an incentive program for private afforestation at present, and that it has made very modest progress. This results I think because (1) It has not been given top priority by forest service personnel, and it has not consequently received their fullest attention. (2) Landowners are not approached directly and encouraged to engage in forestry. The initiative rests with the land owner. In a cultural milieu to which forests and the practice of forestry are quite alien, it is hardly surprising that

success has been limited. Agricultural advisors are not aware of and may not be sympathetic to the idea of integrating forestry into the farm management plan. (3) The program has been inflexible as to requirements such as spacing of trees, species selection, etc. (4) Farm incomes have been so low that little surplus was available for investment in tree planting and culture. (5) Competing uses for land normally regarded as suitable for forest production, such as the various drainage and mountain lamb schemes have been heavily subsidized.

This last point argues the case very strongly for an integrated approach to rural land use planning in Ireland. Ideally the impacts of various land use "mixes" should be estimated, and then the government's incentive scheme could be tailored to generate these desired impacts. Impacts would include employment and income generated and their distribution, balance of payments effects, return on invested capital, environmental and aesthetic considerations such as ecosystem stability, species diversity, extent of open and green space, water and air quality etc., together with the costs at which all of these impacts can be generated. In the absence of such an inclusive rural land-use policy, I will concentrate on the more "parochial" options available at this stage to encourage private afforestation.

As an economist of sorts I'm aware that small private forest holdings have often proved uneconomical to "manage" in other countries and therefore form an unreliable source of wood fibre at best.

What can be done to overcome some of the objections listed above?

Since farmers' incomes can be expected to increase quite rapidly in the future, they will be more financially able to invest in trees, *if* encouraged to do so. Thus I would favour an intensification of personal contact and encouragement to plant for their family's future.

The participation of insurance companies might be engaged in this effort: for young farmers especially trees are a solid hedge against inflation and afforestation could conceivably be sold as a life assurance policy.

A strategy which I find appealing is some form of State-private co-operation, say where the land is planted and maintained by the State, but remains in the ownership of a private individual, who receives some fraction (say 30 per cent) of the net proceeds for permitting afforestation of his or her land.

Flexibility would be essential; where at all possible the "whims" of the land owner should be indulged as to species, tree spacing, etc.

The lack of participation of the wood industries in tree growing in Ireland is in marked contrast to practice in other countries. In the U.S. for example companies own forest land, sponsor tree farming on small farms, etc. I believe that the larger Irish forest industries should be encouraged, pushed or if necessary blackmailed into the tree growing business.

As a provisional goal I would like to see the following afforestation ownership picture: 1 million acres (400,000 ha) in State ownership, 500,000 acres (200,000 ha) in industrial ownership, and 500,000 in joint state-private ownership, to yield a total of 2 million acres, which at 11% of our total land area will still leave us one of the least forested countries in Europe.

The important thing to note is that such a picture would not result in simply "more of the same".

Firstly the average land quality of the private plantations is likely to permit a much wider range of species to be planted than is presently possible on government lands. This would be a very significant gain; forestry dependent on one species is no more stable in the long term than Southern cotton or the potato. If hardwood culture were to be revived, both our hardwood-using industries and the aesthetic quality of the countryside would gain.

Another important contribution would be the creation of a powerful source of ideas concerning forestry and forest practice which would be external to the Forest and Wildlife Service. The type of very creative tension thereby generated can be observed in the Southern U.S., and all of forestry profits.

Lastly, the co-option of a powerful interest group, i.e., farmers, to the forestry cause, together with the goodwill already in evidence elsewhere and the "natural" expansionary momentum of government programs should assure us of firm political support for the future.

To summarize, I'm suggesting that in diversity of species, ideas, interest groups and power bases lies the best hope of sustaining and expanding a viable Irish forestry estate.

REFERENCES

CSO (1966) *Statistical Abstract of Ireland 1966*. Government Publications, Dublin.

CSO (1970) Irish Statistical Bulletin, March.

Moak, James E. (1971) *Forestry: Its Economic Importance to Mississipi*. Bulletin 785, Miss. State Univ. Agricultural and Forest Experiment Station.

An Unusual Frost in September 1972

O. V. MOONEY[1]

In the ordinary course of events the adverse effects of low temperatures in forestry in Ireland are experienced mainly as a result of spring frosts, and perhaps to a lesser degree winter frosts with particular species.

In this regard many will remember the frost of 1961 when temperatures as low as –7.8°C (Grass Min.) were recorded on the night of May 27th and 28th. This frost, not always as severe as –7.8°C was widespread throughout the country and considerable damage was caused to the new shoot growth in young crops of Sitka spruce, Norway spruce and Douglas fir, and in some cases silver fir was killed outright. Older foresters will remember the persistent low temperatures in December 1939 and January 1940 when there were 15 days of ground frost in December and 19 days in January, temperatures as low as –11°C. were recorded in many places. These were the frosts which desiccated the foliage of *Eucalyptus globulus* in the eastern coastal regions, and elsewhere many tender species of the genus were wiped out completely (Mooney 1960).

Frost is a continual hazard of course in the nurseries in the winter and spring months, but here the danger is mainly from "frost lift" from which seedlings are protected by lath covers from September to May.

However, on the night of September 7th and 8th, 1972 an exceptional phenomenon took place and a frost occurred which did considerable damage to the green foliage of young conifers. The first and most dramatic reports of this event came from Donadea Forest in Co. Kildare where the appearance of one plantation at Killyon (Dunfierth) was described as if a fire had passed through it. Later investigations revealed that this same frost had damaged Sitka spruce, Douglas fir and Scots pine in many places throughout the country. From assembled information it seems that damage from this frost was observed as far west as Gweesalia, on the west Mayo coast, Cloosh Valley in Co. Galway and as far south as Mallow in Co. Cork but, although sub-zero temperatures were recorded from many places the severest damage was observed in the region of Counties Kildare, Meath and Westmeath.

---

1. Forest and Wildlife Service, Department of Lands, Dublin.

Foresters who have thirty years or more of experience in the field are unanimous and positive in asserting that no frost phenomena of this sort had ever occurred in their time.

In this regard therefore the records from the Agrometeorological Bulletin of the Irish Meteorological Service from September 1972 are of relevance and interest. The report states that "the month was very dry and sunny" but goes on to say that "the air frost which affected places in the Midlands and West on the 8th was one of the earliest autumn air frosts on record, at Birr this was the earliest air frost for over a hundred years". From the 1st-10th September Grass Minimum temperatures of –5°C. or lower were recorded from Carlow, Mallow, Killarney, Tralee, Kildare, Ballinamore, Ballinrobe, Dunsany and Wexford but there were low temperatures also for several days at the end of the month.

Damage to young plantations is, however, generally attributed to the 7th-8th September period and was recorded mainly on Sitka spruce, Scots pine and Douglas fir, the last being very severely damaged in some places. Except for minor damage in a few places Norway spruce seems to have been unscathed.

At Killyon property of Donadea Forest where damage is regarded as being particularly bad it has been possible to make closer observations than at other places. The plantation was laid down in 1970 and at the time of the frost had almost completed three growing seasons. The site was a virgin raised bog at an approximate elevation of 85m O.D. and had been duly ploughed and fertilised with ground rock phosphate in preparation for planting. The species available with seed origins were as follows: Sitka spruce (Forks, Washington), Contorta pine (Cloosh Valley, Co. Galway), Scots pine (Brandon Park, B.F.C. plus stand), Scots pine (Killyon, Co. Kildare) and western red cedar (Hoquiam, Washington). The damage on the Sitka spruce was widespread and estimated to have affected 60% of the crop in greater or lesser degree. It was characterised by total browning of the individual needles over most of the tree but particularly on the side branches. Usually, however a rosette of needles around the buds remained green and as far as could be ascertained the buds were not damaged. Nevertheless damage was erratically distributed over the plantation and some trees remained unscathed for no obvious reason, though there was some suggestion that the tallest trees in a height range of 35 cm to 180 cm were less discoloured. Scots pine with a height range of 35 cm to 155 cm was similarly affected. The total visual effect was well described as resembling the aftermath of a fire because there was a very strong red tint in the general needle browning. To foresters in this country it is very remarkable indeed that Scots

pine which has been regarded as absolutely frost hardy should prove vulnerable. A very interesting feature was the fact that a small area of planted Scots pine originated from seed collected from 120-year-old trees at Killyon was undamaged. Contorta pine, except for some very infrequent suspected cases was undamaged as was also the western red cedar.

The Grass Minimum temperature recorded for the night of 7th-8th September at Lullymore, 8 miles away on a comparable site, was –6°C and may be assumed to apply to Killyon.

Results of a study of the annual pattern of basal area growth for Sitka spruce, Scots pine, Norway spruce and contorta pine carried on from 1961 to 1967 (O Muirgheasa 1964, Robinson and Purcell 1972) show that the growth of these species ceases sometime between the 19th and the end of October and that although 75% of the growth has been accomplished at the end of July the trees are still quite active in September. The late (lammas) shoot growth of Sitka spruce that occurs in September and October of some years is well known.

This occurrence of autumn frost damage would appear to be in agreement with the findings of Nielson *et al* (1972) that under forest conditions Sitka spruce shoots are most susceptible to damage by freezing in September/October, even more so than in spring or summer and that hardiness rapidly develops in October and early November.

At the present time (March 1973) both the Sitka spruce and Scots pine at Killyon have lost the red tint displayed by the needles immediately after the frost and have become a dull brown, and to some extent the needles seem now to be falling from the Sitka spruce.

The damage caused by the frost of September 7th/8th 1972 may not kill many plants, and with the Sitka spruce full recovery may be expected ultimately, but there is no doubt that there will be considerable retardation of growth both in the Sitka and Scots pine. A severe spring frost in May 1973 could now seriously threaten the survival of the Sitka spruce.

Acknowledgements

Reports and information received from many Research foresters were indispensible in writing this article and are acknowledged with thanks. In particular the essential early reports and observations from Mr. Peter Crowe at Donadea Forest have been invaluable. The writer is also indebted to Mr. Connaughton of the

Meteorological Service and to An Foras Taluntais for providing essential weather information.

REFERENCES

Meteorological Service. *Agrometerological Bulletin* September 1972. Department of Transport and Power, Dublin.

Mooney, O. V. (1960). The development of eucapypts under Irish conditions. *Irish For.* 17, 3-20.

Nielson, R. E., Ludlow, M. M. and Jarvis, P. G. (1972). Photosynthesis in Sitka spruce (*Picea sitchensis* (Bong.) Carr.) II. Response to temperature. *J. appl. Ecol* 9, 721-745.

O'Muirgheasa, N. (1964). The pattern of annual growth in basal area of Sitka spruce, Norway spruce and *Pinus contorta* in Ireland. *Irish For* 21, 63-73.

Robinson, J. D. and Purcell T.J. (1972). Annual pattern of basal area growth of conifer species. In *Forest Research Review 1964-70.* p. 100-104. Stationery Office, Dublin.

Six 18th Century Letters

EILEEN McCRACKEN

The following six letters, written between 1728 and 1764, are of interest to foresters in that they describe some planting at a relatively early date and they also illustrate the difficulties the early planters had in obtaining trees.

The first four letters[1] were written by various employees to Henry Boyle (1682-1764) who represented county Cork in the Irish House of Commons from 1727 to 1756 and who was also Speaker of the House from 1733 to 1756 when he was created Earl of Shannon.

The fifth and sixth letters[2] are from Anthony Foster to Sir Maurice Crosby. Anthony Foster (1705-1779) of Collon, County Louth, represented Dunleer in the Irish House of Commons from 1737 to 1760 and County Louth from 1761 to 1777. He was the father of John Foster, the prominent planter and last Speaker of the Irish House of Commons. The Prime Serjeant at Law mentioned in these letters was Anthony Malone (1700-1766) of Baronstown, Westmeath, M.P. for the county from 1727 to 1760.

With the exception of the first letter, the spelling has been modernised.

Castlemartyr
28 Mar 1728

Garratt Fleming to (Henry Boyle)

I have made so bold to send you some account of what I did since yr Hon. left hom. I got as many ash trees at Ballynacurrow as finished the work of Ballyoughtrow and as many English Ellams as filled up the ground where the Dutch Ellams was in the walk and have planted the Dutch Ellam within side the wall in the baron meadow. I have laid a great quantities of English and Dutch Ellams and have satt a great many English and Dutch cuttings of Ellam. Likewise a good quantity of English Ellam with firm mulberry (?) cuttings. I got 400 of English and Dutch Ellams from Mr Croker from the county of Limerick and have planted them out by way of a nursery in Maurish Joyce's garden and I got from the same gentleman as many Dutch aloor (poplar) as filled up the ground

1. National Library, Ireland. Shannon papers, MS 13296, nos. 12, 23, 59, 80.
2. National Library, Ireland. Talbot Crosbie papers, MS Box 188.

next to Cocker's orchard where the ash did not thrive and the high ground that is above that I planted with birch, the bowling green is planted with sickamore. I bought a thousand fir trees from Cott Maynard and filled up the auld nursery and what remained I planted them in the garden above the nursery. I have planted a great number of your cuttings in rowes between the fir. I have bought a hundred of English Ellames and planted them where John Hannon had his potatoes I have sett a grate quantites of fillbuds deccaries and Crabstocks with a good quantity of walnuts and Phesnuts, the Phesnut walk is finished and the grass appears in it very fine. I have planted a great many yews and Lorroll on both sides of the walks for underwood and have left holes between the lorrell and yew in order to plant holly in them which is all at present from yr humble and most obedient servt.

28 Feb 1730

Peter Smith to Henry Boyle

Last night when I came home I found left at my house a box nailed with a direction on it to you and was told that a basket of trees came ashore with the box that was left in the watch house. I looked in the basket but not in the box. The weight and bulk of both one horse and trundle can carry with a great deal of ease which if you will send to Garretts on East Passage and forward your servants to Cove I will take care to send them with him by boats to where his carriage shall be.

Castlemartyr
30 March 1755

Robert Pratt to Boyle

Last Thursday's post brought your directions about the beech mast . . . William Flemon had his people last week mostly in the Garden and digging the nurseries, he also put a good many oaks into that strip of ground which lies north of the river and west of the bridge on the Cork road and as you said nothing about the grafting he would lose no more time and has gathered a good number of what we esteemed here the best kinds of fruits and of them we chose to have a good number of the glackguard (?). I cannot tell you for certain that the rows of elms by the river are entirely finished as to the cleaning of them as I was prevented from going down yesterday but Mountain who superintended that work promised me they should be done so I believe that job is over but I believe we shall give the french elms a day or two next week.

I cannot tell what effect this brushing will have on the future growth of the trees but for the present it has greatly improved their appearance. This week the ground shall be prepared and I hope sown with the beech mast. Dry weather would be of great use in picking that ground from all incumbrances but especially the scutch grass roots with which it is much overrun and as we had a pretty good deal of rain last week Flemon chose to wait for a day or two of dry weather before he sets about it. The seed shall be steeped in aloes water and every other of your directions followed but I have not yet consulted with Mr Flemon how we shall managed as to what beech are now growing in that land neither have you said anything about them but yesterday I went over part of that ground and found several poor miserable plants that may be said to exist but that is all. I do not know if they will bear transplanting but probably Flemon will not be at a loss to manage them.

Castlemartyr
28 August 1974

Robert Pratt to Shannon (Boyle)

Fleming (Flemon of earlier letters?) was almost affronted to think that he should be suspected for filling the hole near the great ash trees and says . . . that the seeds shrubs etc should and shall be all carefully attended to. We for a good while dispaired of the growing of the pine seed and I have been on my knees poking for it after we expected it ought to be up but at last what was sound of it I believe was less than half the seed was pleased to show itself above ground and so far it is in a good way.

Carrownekelly
22 March 1749

(Anthony) Foster to Sir Maurice Crosby at Ardaa.

I wrote to you from Drewstown in the county Meath believing the trees were on the road to Ardaa but by the damnable neglect of the person who Mr. Mahon trusted in town to get 'em from on board the vessel they were brought here upon Mr Daly's cars the mistake was owing to the bundles being marked with the Prime Serjeant's mark. The trees are in exceeding good health and will order them to be managed as I directed in my (?) . . . put into water for at least 6 days and nights, steeping fills the venells more than a month in the ground would do. The roots must be pruned

before they are put into the water. And as the (?) make the gardener prune the heads of the pears as if they were to be planted against the wall and he must leave two at least or three shoots or (?) on every tree which must not be shortened nor pruned but left to their whole length. Water them well after they are planted and over a week on very hot weather which must be done in the evening. These branches which are left on the trees are not to be beheaded or cut down till next winter and if the tree shoots strong they never will be be shortened. The peach trees and filberts would be much the better of three or four days steep.

Baronstown
30 March 1749

Same to same

As I am so well satisfied of your care of trees that I will make all the trees good that fail or return the money. The Prime Serjeant did pay the carriage of the trees from London to to Chester and the freight etc and I think it would be proper you would write to him about it as they were marked with his mark and had a vast many parcels himself which made him pay for your bundles by a mistake.

Silviculture and Forest Management in France

P. M. JOYCE[1]

This article aspires to convey an impression of the silviculture and management of some of the broad-leaved and coniferous forest types which constitute the forests of France. For this purpose a number of forests, characteristic of the part of the country in which they grow, are described and their management discussed. In addition, the role of forestry in the consolidation of marginal agricultural holdings — *remembrement* — is outlined.

The itinerary commences in the State forest of Darney in the department of Vosges, and moves clockwise through the departments of Jura, Côte d'Or, Saône et Loire. Puy-de-Dôme, Cantal, finishing in the department of Corrèze in the *Massiff Central*. (see Fig. 1).

INTRODUCTION

One-fifth of France is covered by forests which are divided fairly equally into three major forest types; high forest, coppice or coppice with standards and low productivity areas not amenable to regular management. Two-thirds of the forest area is under broad-leaved species, mainly oak, beech and hornbeam; the remaining one-third consists largely of maritime pine, Scots pine, silver fir and Norway spruce in that order.

The area under forest is approximately 12 million hectares. This does not include roadside trees, lines of poplar, parkland trees, etc., which together are estimated to be the equivalent of another 2 million hectares. Forest ownership is divided into State (1.6 million ha), Communal (2.4 million ha), and Private (8 million ha).

There are about 2000 State forests (*forêts dominales*), 14,000 Communal forests (*forêts communales*) and 8000 communal sections (*forêts sectionales*).

In the total 10 million ha (including roadside trees, etc.) of private forest, 3.5 million ha consists of woods less than 25 ha in area. These are owned by approximately 40,000 people. The remaining 6.5 million has 1600 separate ownerships. Many of the woods in private ownership are not managed or are mismanaged.

1. Department of Forestry, University College, Dublin.

The allowable cut is reckoned at 80% of the increment, but only 50% is cut. An increase of 50% in the cut could significantly influence the supply position; France is a large importer of softwood.

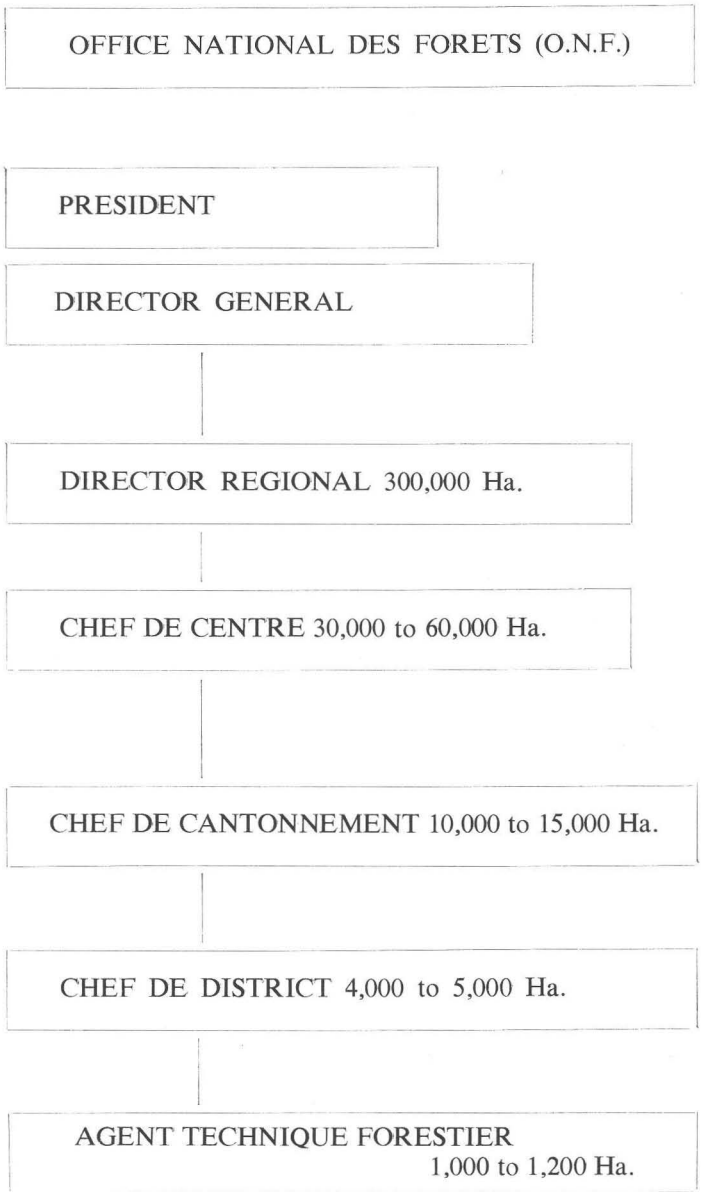
ORGANISATION

Forestry is administered by the Ministry of Agriculture. There are three levels: national, regional and departmental. The most outstanding feature is that private forestry is administered separately from State and Communal forests both at regional and departmental level — a situation decried by many forest officers.

The *Office National des Forets* is a semi-autonomous body responsible for State and Communal forests. State forests are divided

Fig 1. Map of France showing the areas visited. 1. Vosges; 2. Jura; 3. Côte d'Or; 4. Saône-et Loire; 5. Puy-de-Dôme; 6. Cantal; 7. Corrèze.

TABLE 1, shows the hierarchy and territorial responsibilities within the *Office National des Forêts*:



into economic units, not necessarily contiguous, which operate as going concerns without financial help from the Exchequer. Communal forests can draw from the National Forestry Fund—F.F.N.—a fund created by putting a tax on articles made of wood.

Private forestry is the responsibility of the *Direction Departmentale d'Agriculture,* but personnel within the Ministry of Agriculture can move laterally at departmental, regional and even national level; a professional forester is currently head of Administration and Finance. Similarly, there are many transfers from the *Service Forestier* (Private Forestry) to *Centre de gestion* (State and Communal forestry) and vice versa.

VOSGES

The forest of Darney is typical of the forests of the premontane Vosges where the broadleaved species of the lowlands begin to blend with the conifers of the mountains. The soil is mostly of limestone origin producing good oak and beech, but in places and particularly on eastern slopes, the limestone soil has been eroded to expose the sandstone underneath. On this *"buntsandstein"* soil broadleaves grow poorly and the objective is to replace the beech with Douglas fir.

The State forest of Bois le Comte is, for administrative purposes, part of the forest of Darney. Here a soil survey has been done by forest staff and a management map prepared showing the objectives. On areas coloured green the objective is oak high forest on what was formerly oak coppice with standards. The rotation will be 240 years to produce oak veneer which is currently fetching 2000 Frs (£160) per m^3. Mean annual increment is 3 m^3 per ha. On areas coloured blue the objective is beech of veneer quality. The eroded slopes are shown in red on the map and here the objective is Douglas fir on a 60 to 80 year rotation. The beech is being cleared on a modified Group System and Douglas fir introduced at 3 x 2.5m espacement (1500 per ha). The wide spacing allows for a certain amount of regeneration by beech and *Abies.* Cleaning will be done manually for about four years after planting.

In the neighbouring communal forest of Bleurville a systematic conversion from broadleaved forest to Douglas, spruce and pine forest is in progress. This is being effected by clear cutting about 4 ha areas and planting with conifers. The objective is a dbh of 45 cm at 80 years.

The State forest of Darney Martinville occupies 5300 ha, mainly oak and beech. Here, a 150 years old beech stand is being regenerated by the Uniform System. Particulars for the crop are as follows:

Vol. per ha in 1939, according to Schaeffer's tariff: 494 m^3;
Vol. per ha in 1958, according to Schaeffer's tariff: 553 m^3;
C.A.I. from 1939 to 1958: 4.40 m^3 per ha;
Increment %: 0.56%
Thinning cycle: 16 years;
Seeding felling in 1970 removed 104 m^3 per ha.

The regeneration period is reckoned at 20 years, so there should be three or four secondary fellings and then the final felling. Natural regeneration is abundant so the regeneration period may be shortened as happened in an adjoining area. Here the seeding felling was in 1948, the secondary felling of 200 m^3 per ha in 1952, and the final felling of 150 m^3 per ha in 1956; a regeneration period of 8 years.

Natural regeneration of beech by the Uniform System in this region gives an extremely dense crop of young growth which formerly had to be weeded and thinned gradually over the years to prevent overcrowding. This was a very expensive operation. The present approach is to select the final crop trees — 100 per ha— when they are 25 years old and give them adequate growing space by removing competition. This approach is almost identical with the "Scottish Eclectic" thinning system except that pockets in between the selected trees are ignored. Since the management objective is a 65 cm dbh average tree, it is hoped to shorten the current rotation from 160 to 140 years by providing more growing space for the selected trees. The succeeding rotation will be shortened to 120 years. Shortening the rotation in steps of 20 years is due to a management constraint associated with the regeneration period.

In an adjoining area a comparison can be made between plantation oak and naturally regenerated oak, both established in 1950. Apart from espacement, the cost of regeneration seems to provide the greatest difference between the two crops. Natural regeneration costs 375 Frs per ha; artificial regeneration costs 1700 Frs per ha; but it was admitted that some hidden costs may have been omitted in the natural regeneration figure. Method of selection of final crop trees — 80 per ha — is similar to that already described for beech. The aim is to get a radial increment of 2 mm per annum on the selected oak.

JURA

The Jura range is an extension of the Vosges mountains south of the Belfort Gap which separates the two mountain chains. Like the Vosges, the region is heavily wooded with broadleaved species of

the pre-montane plateau giving way to coniferous species on the higher plateau.

One of the important forests of the Jura is the State forest of la Joux. It is 2660 ha in area divided into 5 series and managed by the *quartier bleu* (regeneration area) method. Species are silver fir and Norway spruce with a M.A.I. of 11 m^3 per ha. The annual cut is 30,400 m^3 indicating that the increment is being cut as might be expected in a normal forest. Unfortunately yield regulation is often confounded by the occurrence of windthrow (*chablis*) such as that of the 25th April, 1972, when more than 100,000 m^3 was blown in the district. The forest is of high recreation value and a well designed drive of 50 kilometres takes in la Joux as well as the forests of de Levier, la Fresse and Chapeis. A feature of la Joux is the President — a massive silver exceeding 20 m^3 in volume.

Hunting is permitted during the season September-December. On one tract of 600 ha the rental for a nine year period is 1 million Frs. The annual shoot is 12 roe deer and as a means of control, bracelets are issued to the hunters. If the kill has not got a bracelet on its leg it is assumed to be taken illegally.

At a lower elevation on the pre-montane plateau is the forest of les Moidons where the indigenous oak, hornbeam and beech is giving way to conifers. Here in the past wood was used for firewood to evaporate water from the salt solution obtained from mines in the Jura. When other sources of salt became available the oak and hornbeam was not needed in the same quantities and conversion from coppice with standards to coniferous high forest commenced in 1922.

Conversion was effected by a shelter-wood system. 60% of cover is removed leaving 600 standards per ha and silver fir — 2500 plants per ha — is introduced. Eight years later the standards are removed and after another five years all coppice is removed leaving nothing but silver fir. The plantation is inspected after another three years to ensure that it is satisfactory. The use of the shelter-wood as a protection against frost is now being questioned and there is a tendency to clear-cut and plant silver fir in the open. Where beech exists it is being retained to grow to high forest because it is of good quality. Oak, on the other hand, is of poor quality and is not retained.

Further west near the town of Saint-Laurent is the Mont-Noir Forest which includes the communal forest of Saint-Laurent en Grandvaux — a forest of about 800 ha divided into 3 series — located on the edge of the second plateau. This forest came under management in 1856 and the Selection System (*jardinage*) was practised for three years. From 1859 to 1894 a system of cutting

on a 144 year rotation and natural regeneration was practised and in 1894 the forest was divided into two series and returned to the Selection System. This system is still being practised but for economic reasons it is somewhat different from the traditional Selection System. Instead of working tree by tree, the tendency is to work in groups (*bouquet*).

Although the proportions by stem numbers and volume approaches closely to the ideal, there is a departure from the accepted normal growing stock of 272 m^3 per ha in the case of both series. One has a volume of 368 m^3 per ha indicating too many large trees and the other a volume of 264 m^3 per ha showing slightly too few large trees. As a measure of control, stem numbers per unit area are plotted against their diameters giving a reversed J curve and this curve is compared with a theoretical curve for a normal selection forest.

Calculation of the allowable cut for each series is by an adaptation of Melard's formula. A separate calculation is made for each species. The annual return to the community from the 800 ha forest is 5000 Frs.

The Jura department possesses a modern seed extraction plant which is used to less than full capacity because of lack of demand for seed. Cones of silver fir, Scots pine and Norway spruce are collected during a three-week period — end September/beginning October. The seed collectors are paid by the hecto-litre and the average payment per person is £20 per day.

CÔTE D'OR

This department is situated in Burgundy — the famous wine district — in the plain of the river Saône. The climate is continental; precipitation 750 mm and mean temperature 11°C.

The State forest of Citeaux, 3585 ha in area is situated on a plateau of a mean altitude of 210 m midway between Beaune and Dôle. The forest, consisting of 80% oak, 15% beech and hornbeam and 5% other broadleaved species, has been worked on a coppice with standards system since 1833. The rotation for coppice is 30 years and that for standards is 180 years. Coppice keeps the stems free from heavy branches, but since oak coppice needs sufficient light to grow properly, epicormic branches tend to develop on the oak standards. Hornbeam in the understory will prevent this process which degrades the quality of the oak. Standards ages are in multiples of the coppice rotation age, since seedlings will only develop when the cutting of the coppice gives sufficient light. The standards

are classified on this basis, e.g. a *moderne* is two coppice rotations an *ancien* is three coppice rotations, etc.

The forest is now in the process of being converted to high forest by the traditional *quartier bleu* (regeneration area) method. For the purposes of management each series is divided into three sections:—

1. Areas which are approaching the rotation age for standards or have already reached it. This is the regeneration area —*quartier bleu* — and is coloured blue on the map.
2. Areas composed of compartments which will be allotted to the regeneration area during the next revision of the working plan. This is the preparation area — *quartier jaune* — and is coloured yellow on the map.
3. Areas composed of compartments containing young and semi-mature stands that need weeding and thinning. This is the improvement or amelioration area — *quartier blanc* — and is coloured white on the map.

At Citeaux the "blue" area is being regenerated over a 30 year period (1960-1990). Advantage is taken of a mast year and regeneration is usually well established within 10 years. When the regeneration is shoulder high, paths 1 m wide are cleared at 10 m spacing to break up the block and make it easier to direct and measure the work output. Cleaning must be done at regular intervals to ensure survival of the oak. This is particularly so when hornbeam is present. The hornbeam grows much quicker than the oak in spring and has to be cut back to half its height. Yet hornbeam is essential to the success of oak regeneration in that it keeps the ground cool and moist. The cost of cutting back the hornbeam every second year is 360 Frs (£30) per ha.

In younger oak stands — 70 to 90 years old — the conversion from coppice with standards is effected along lines similar to those practised at Darney in the Vosges. Final crop trees are banded — 80 stems per ha about 10 to 12 m apart — and competitors are removed. Beech and hornbeam are encouraged in the lower story to ensure that there are no epicormic branches.

Expected production from oak in the forest at Citeaux is 4 m^3 per ha per year. Of this 2 m^3 will be suitable for furniture and 2 m^3 for inferior uses such as railway sleepers. The primary objective is oak 65-70 cm diameter at 180 years. Oak is the only species worth considering on this sandy clay and compacted clay of low nutrient status and it is felt that the objective will be best achieved under high forest. To allow the speedy conversion to high forest the area has been divided into five series. Secondary objectives are an increase in tourism and hunting. Income from the 3585 ha is one

million Frs per year while expenses are a half-million Frs per year. 5% of the income is from hunting.

The improvement of hunting facilities is being pursued and to this end an area of 450 ha in the neighbouring forest of Beaune was fenced and stocked with wild boar. The hunting is rented on a 9 year basis by a syndicate and 75 boar are killed each year. This high rate of kill is possible because the female has three litters, of seven to eight young per litter, every two years. Roe deer in this region number less than 1 per 100 ha at present. In an attempt to improve their numbers a 30 ha block has been fenced in the forest of Citeaux and it now houses two male and two female roe deer. Five more females will be added to this number and in three years time they expect to have 25 animals. They will then release 10 of these and hope to build up numbers in this fashion. The fallow deer is not considered by the forest officers to be a game animal. It is something you see in a park on Sundays!

SAÔNE-ET-LOIRE

Douglas fir is a relatively recent introduction to this region. The oldest trees are on the estate of the Comte de Rambuteau where they are regenerating naturally.

The soil is of granitic origin. Altitude is 400 m; precipitation is 900 mm and mean temperature 10°C.

The Douglas fir stand in the communal forest of St. Bonnet de Joux is from seed collected on the Rambuteau estate. Top height is from 30 to 35m at 36 years of age and the dbh range is from 20 to 45 cm. It is proposed to select 400 stems per ha and high-prune them. Douglas fir lumber commands a premium price in this region for the construction of chalets. Douglas is an automatic selection for new plantations and the current espacement is 3 x 2 m.

Clermont-Ferrand is the capital of the Auvergne region which includes the departments of Puy-de-Dôme, Cantal and Corrèze. They are partly situated in the Massif Central, a high plateau which rises abruptly south of Clermont. Although the climate is oceanic, winters are very severe and the growing season is short. This has led to a depressed state of agriculture. Geological formations are frequently of volcanic origin and extinct volcanoes are numerous, particularly in Puy-de-Rôme.

From a land-use viewpoint these are problem areas for agriculture. In the Col de Moneidiers, department of Corrèze, for example, recent demographic studies show that people are at half the average income level for the country and are leaving rapidly. In an attempt

to come to grips with the situation the Government has introduced a policy of land consolidation (*remembrement*) which involves zoning those areas listed for improvement. To qualify for zoning, a farmer must have at least 10 ha of land. If he wishes to zone and put sheep or cattle on part of his holding the Government will contribute 75% of the cost of the land improvement on the grazing zone *provided* the remainder of the area is planted. The options open to anyone who wishes to plant are as follows:—

1. The State provides the plants and the owner does the planting.
2. The State supplies vouchers which the owner can use to purchase plants.
3. The State pays 40% of what it estimates the cost will be.
4. The State provides 80% of the total cost at an interest rate of 0.25% over a period of 30 years.
5. The State provides the total cost and recoupes the money by taking half the profits when they occur, until the total amount has been recouped. There is no interest charge.

While the schemes listed have contributed to an increased area under forest, there are some criticisms from the national point of view. Many owners of small holdings emigrate to the cities after planting the land and never bring it under management. "The holding becomes merely a possession like a ring on one's finger" to quote one forest officer.

Access to the planting schemes is also available for communal forests and sectional forests as well as to the private owner. Within the Auvergne forest region 20% of the forest is State owned and the remaining 80% is almost entirely sectional forest. This means that they belong to a division or a section of the commune, i.e. to villages which make up a part (or section) of a commune. Legally, the inhabitants of those villages possess the sole rights to common properties which are distinct from those of the commune. The "section" is therefore a kind of legal entity administered jointly by the Municipal Council and a Prefect (a Government representative). Under the terms of the Municipal Code, it is compulsory to take the advice of a commission made up of three members representing the "section" in all matters concerning the forests: i.e. (a) whenever land already under forest or land to be afforested is to be put under the control of the *Office National des Forêts* or (b) for reafforestation by agreement of *Fonds Forestier National* (National Forestry Fund).

PUY-DE-DÔME

26% of the area is forest, amounting to 207,800 ha. The *Office National des Forets* has responsibility for 32,187 ha of this area mainly in the form of communal forests and sectional forests (28,720 ha). Composition by forest types is: conifers 18,425 ha; coppice and coppice with standards 3,100 ha; other types 2,587 ha. The annual production is 120,000 m^3.

The conifers are not indigenous to the region. Before the French Revolution the natural vegetation was beech which was cut down during the Revolution. Attempts were made to reafforest without much success, since the communes to whom the land belonged were not enthusiastic. The floods of 1860 were attributed to the cutting of the forests and a law was passed making it compulsory to reafforest. The communes disagreed but eventually conceded 20% of the area to forest. Some who still did not agree set fire to the forests, so the State introduced a subvention for planting and compelled the dissenters to pay the subvention. Forest workers were well paid and within ten years everything was settled.

A typical forest dating from this period was established by direct seeding with 10 kg of Norway spruce, Scots pine, oak and beech per ha. The oak and beech were introduced because the people who did the work came from the plains. The forest will be regenerated over the next 40 years using the Group System. This involves taking advantage of gaps caused by windblow, enlarging them and introducing some silver fir. It is hoped to get regeneration of Norway spruce in the enlarged group and that shade will still be sufficient to inhibit growth of Scots pine regeneration, which it is considered desirable to eliminate. Another factor to be taken into consideration is the necessity to allow room for tractor extraction when making the openings. Production is 8 m^3 per ha while the current cut amounts to 12 m^3 per ha.

The commune of St. Julien-Puy-Lavèze has recently been engaged in a land consolidating scheme. This involved selling land to villagers in order to increase their holdings from 15 ha to 25 ha. The remainder of the land is being retained and planted with the agreement of the villagers. Planting is done in Spring on 80 cm strips which have been rotovated the previous Autumn.

The State forest of L'Eclache was established in 1850 by cutting out the beech coppice and sowing Norway spruce seed. The spruce is of excellent quality and is now used as a source of seed. Price is 200 Frs (£17) per m^3 on root and the material is in good demand for furniture, roofing, etc. The average income is 1000 Frs (£80)

per ha per year. Altitude is 1000 m; precipitation is 1100 mm per year and the soil is deep and of mica schist origin. Douglas fir is absent; it does not grow well above 800 m altitude. The Group System is being practised and provides an excellent example of the problems associated with too profuse natural regeneration. The labour costs involved in thinning out at intervals are becoming prohibitive and there is a proposal to move towards the Swedish method of working with larger cuts at fewer intervals — a question of simple economics.

CANTAL

The main climatic features of the region are: a rainfall of 1000 mm; thirty-five days of snow and a covering of snow from November to March; an average annual temperature of 7.4°C; frosts in June; wind speeds of 60 to 80 miles per hour causing windthrow and a short growing season from May to September.

In the vicinity of Allanche the soil is a brown earth of basalt origin with a pH of 6. Forests are mostly sectional forests established around 1863. The principal species is Scots pine (53% by number, 41% by volume) of Haguenau origin which is ill-suited to this climate and regenerates very poorly. Its main silvicultural value is that it allows the introduction of Norway spruce and silver fir under shelterwood conditions.

Norway spruce representing 38% by number and 48% by volume regenerates well as soon as the stand is opened. It is, however, prone to attack by *Trametes pini*. Silver fir, which accounts for less than 10% by number and volume grows well and produces high quality wood. Its spread will be encouraged to give a better proportion than at present.

In the sectional forest of Allanche a working plan spanning the period 1967-1986 has been prepared by the O.N.F. and agreed by the Municipal Authority. The Uniform System (*futaie reguliere*) is being adopted and the objective is an average dbh of 55 cm. Depending on the development of the stands, their age and regeneration the forest is divided into three areas according to the *quartier bleu* (regeneration area) method:

Blue Section. (37% of the area). Areas where trees are to be felled for regeneration during the period of the plan.

Yellow Section....Regeneration is planned during the next working plan period — after 1986.

White Section. Improvement cuttings for better growth.

From increment borings the current periodic increment is estimated to be 1220 m^3 per year (for the 151 ha forest). Standing

volume is 230 m^3 per ha — indicating a degree of understocking. For this reason the annual cut is fixed below the increment level — at 1000 m^3 per year. This is the allowable cut. Cuttings will be made in the yellow and white sections every 10 years. This will contribute an average of 400 m^3 per year over the period so the annual cut for the blue section is 600 m^3.

Control is strict within the working plan area although in areas outside the working plan (but still under O.N.F.) the villages may cut up to four or five times the allowable cut in anticipation. Even within the working plan area yield regulation on an annual or periodic basis can be difficult due to windthrow. For example, twice the allowable cut will be harvested this year because of windthrow. This windthrow usually occurs in small patches which tend to regenerate naturally and form the nuclei for groups in the Group System. In the Uniform System they can be more of a liability than an asset and due to the scattered nature of the windblown trees their value depreciates by 30%.

Villagers are paid for working in the forest and sometimes the proceeds from the sale of forest produce is in part given to individuals and the remainder given to the community. More usually, however, the proceeds go towards the provision of amenities for the community such as swimming pools, road repairs, etc.

Gross income from the sectional forest of Allanche is 200 Frs per ha per year. The community has currently undertaken to plant 200 ha as part of a land consolidation scheme. Planting is in the furrow created by a double-mould board plough and sub-soiler. Spacing is 2 x 2 m.

The State forest of Murat (1010 ha) originally belonged to the Viscomte de Murat but as a result of confiscation of property in the 16th century it became a State forest. It is divided into three areas each of which entail separate planning but only the first two areas (878 ha) were visited. The third area of 132 ha is of relatively recent acquisition and was planted 15 to 25 years ago.

Altitude range is 1100 to 1500 m; precipitation exceeds 1500 mm and average annual temperature is less than 8°C. Two-thirds of the forest is under silver fir and beech; the remaining third, mostly on the upper slopes which were regenerated between 1840 and 1870, is mainly spruce with some larch.

The silver fir stands have been subject to regulation by volume employing the Selection System (*Methode du Controle*). Unfortunately the annual cut was set too low to allow sufficient regeneration. The stands now consist of very old trees without adequate distribution of size classes and are incapable of being regenerated along traditional lines.

In the Norway spruce stands there has been normal growth but unfortunately the sporadic clear fellings have been much too infrequent and the forest is now composed mainly of trees 100 to 130 years old — too old for yield regulation.

To remedy the situation it is now proposed as a last resort to clear fell the first area and replant with Norway spruce. In the second area the Selection System will operate on an *area* rather than a volume basis. Small clearings will be made in spruce and silver fir stands. If this does not promote natural regeneration the areas will be artifically regenerated.

These proposals should result in the regeneration of the greater part of the silver fir stands over the next 20 years. During that period the gross annual revenue for the whole forest will be 560 Frs per ha per year.

CORREZE

The Plateau de Millevaches has a maximum altitude of 900 m; maximum temperature is 27°C; minimum is –20°C with a mean temperature of 7°C. 200 raindays per year give a precipitation of 1500 – 2000 mm. The soil is granitic and deep. The Plateau was devoted to sheep production but numbers have declined over the past 50 years. Forest area is 240,000 ha, 10,000 ha of which is State owned. The remaining 230,000 ha is in 35,000 private ownerships and administered through the *Direction Departmentale d'Agriculture*. Species composition is 150,000 ha broadleaves, mostly oak, beech and hornbeam of rather poor quality, 60,000 ha of Scots pine and Austrian pine, and 30,000 ha of spruce and Douglas fire.

Scots pine was formerly used for pitwood but now there is very little demand for such produce. The region has a high level of emigration and the derelict farms are being planted with Douglas fir and Norway spruce through one of the schemes outlined already. Espacement in existing plantations is 2.80 m x 1.40 m, but currently and in future espacement will be 2.75 m x 2.75 m. Expected production is 12 m^3 per ha per year for Douglas and 10 m^3 per ha per year for Norway spruce. Cost of establishment (direct costs such as plants and planting, cleaning, fire control and roads, etc.) is 2000 Frs (£160) per ha.

Soil pH is usually low, 4.5 or thereabouts, so it is common practice to apply lime to Norway spruce. Douglas fir suffers from copper deficiency resulting in a very twisted growth of the leaders and consequently the stem. The problem is accentuated by nitrogen application.

Hunting arrangements can be made with the landowners provided one has a hunting licence which costs 100 Frs. The quarry is doe deer and wild boar. A three-day shoot in the area last year accounted for 280 roe.

—o— —o— —o—

Forest management in France is a blend of traditional and modern methods. Rotations of 250 years for oak are still being planned where the site conditions are favourable to the growing of high quality material. On other sites, coppice with standards is giving way to high forest, either broadleaved or coniferous, in a rehabilitation exercise at which the French are now past masters. On submarginal agricultural land sheep-farming is being supplanted by tree farming under the direction of the forester. In all aspects of management, economics play a major role demanding the most economical methods of treatment. For an enterprise which must depend upon its own resources, this augers well for the future of forestry in France.

Trees, Woods and Literature—8

A thing which I regret, and which I will try to remedy some time, is that I have never in my life planted a walnut. Nobody does plant them nowadays — when you see a walnut it is almost invariably an old tree. If you plant a walnut you are planting it for your grandchildren, and who cares a damn for his grandchildren? Nor does anybody plant a quince, a mulberry or a medlar. But these are garden trees which you can only be expected to plant if you have a patch of ground of your own. On the other hand, in any hedge or in any piece of waste ground you happen to be walking through, you can do something to remedy the apalling massacre of trees, especially oaks, ashes, elms and beeches, which has happened during the war years.

Even an apple tree is liable to live for about a hundred years, so that the Cox I planted in 1936 may still be bearing fruit well into the twenty-first century. An oak or a beech may live for hundreds of years and be a pleasure to thousands or tens of thousands of people before it is finally sawn up into timber. I am not suggesting that one can discharge all one's obligations towards society by means of a private re-afforestation scheme. Still, it might not be a bad idea, every time you commit an anti-social act, to make a note of it in your diary, and then, at the appropriate season, push an acorn into the ground.

And, if even one in twenty of them came to maturity, you might do quite a lot of harm in your lifetime, and still, like the Vicar of Bray, end up as a public benefactor after all.

From "A Good Word for the Vicar of Bray" (1946) by George Orwell. Included in *The Collected Essays, Journalism and Letters of George Orwell; Volume 4 – In Front of Your Nose 1945-1950,* Edited by Sonia Orwell and Ian Angus. (Secker and Warburg 1968, Penguin Books 1970). Reprinted by permission of Sonia Brownell Orwell and the publishers.

George Orwell was the pen-name of Eric Blair, who was born in India in 1903. After an Eton education he spent six years in the Indian Imperial Police in Burma. The remainder of his life was spent as a journalist and novelist. A passionate socialist, his impatience with the imperfections of the system in practice led to the bitterness of *Animal Farm* (1945) and *Nineteen Eighty-Four* (1949). He died in London, of tuberculosis, in 1950.

The Vicar of Bray (in Berkshire, England) was the subject of the popular ballad beginning *In good King Charles's golden days . . .* describing how he switched his religion and politics to suit five

successive monarchs, with the refrain *And this is law, I will maintain,/Until my dying day, Sir,/That whatsoever king shall reign,/ I'll be the Vicar of Bray, Sir.* The principle is widely applied in all walks of life.

Orwell's essay resulted from his being shown a magnificent yew tree said to have been planted by the eponymous Vicar himself.

Notes and News

QUOTATION

"Most of us who claim that we have no time to read, strangely have no difficulty in finding time to talk."

O. N. Blatchford: *Dissemination and application of research information in the field.* Forestry Commission Research and Development Paper No. 88. 1972.

BRED IN IRELAND

Interest is developing in Britain in the Macedonian pine (*Pinus peuce*) which is one of the most resistant of the five-needled pines to blister-rust. In the British Forestry Commission *Report on Forest Research 1972* Roger Lines and Alan Mitchell describe the progress of plots planted in 1961 on sites in Scotland and northern England. The seed for these came from good stands in Yugoslavia and from the plantation at Avondale, Co. Wicklow. In all cases the trees of Irish origin have grown fastest. The authors suggest that this may be due either to the one generation of selection in the Irish environment, or else to an out-breeding effect.

NOTICE ABROAD (1)

〔世界の林木育種 21〕

アイルランドの林木育種の現況と将来

Tree improvement, its role and future in Ireland

J. O' Driscoll

アイルランドにおける林木の育種計画の進展を評価するには，その森林と林業との歴史，およびヨーロッパ大陸との関係における地理学的な位置づけをよく解理せねばならない。

アイルランドは，北緯51度25分から55度25分にかけて，ヨーロッパの大陸棚のはしっこに位置する。

気候は代表的な海洋性気候で，温和で湿った冬と，涼しく曇りがちな夏とで特徴づけられる。降雪量は西海岸で2,540mm，東海岸地方で685mmと場所によってかなりちがう。

の影響が大きかった。すなわち，気候が冷涼湿潤化したために，今までマツやカンバの森林地であった所に次第に湿原が現出するようになった。マツは，おそらくこの時代に絶滅したものであろう。鉄器時代になると，森林の伐採と農地化という人類の活動が非常にさかんになり，このうごきは何世紀ものあいだ継続した。1,600年頃になると，森林状態に保たれているのは，国土の約1/8にすぎなかったと推定される。この頃の主要樹種は，ナラ，トネリコ，カンバ，ハンノキ，ハシバミなどであった。ナラがいかに多かったかということは，アイルラン

We reproduce part of the first page of an article by John O'Driscoll, of the Dublin Forest and Wildlife Service's Research

Branch, published in the Journal of the Japanese Tree Breeding Association, No. 75. September 1972.

NOTICE ABROAD (2)

The *Ozark Reporter* is published in Stillwater, Oklahoma, U.S.A., and circulates in the states of Arkansas, Kansas, Missouri and Oklahoma. It is the organ of the Ozark Section of the Society of American Foresters. Its issue of December 1972 carried, as being in the editor's opinion of interest to American foresters, the full text of our editorial entitled *"Whereto we pass"* (*Irish Forestry*, Volume 29, Number 1, 1972).

TREE PLANTING CEREMONY

The University College, Dublin, authorities have, in developing their 280-acre campus at Belfield, sought to retain and preserve as many as possible of the old estate trees, and have added to these where necessary by new plantings. This work was described and demonstrated by members of the staff of the U.C.D. Forestry Department on 9th April 1973. On the same occasion a number of trees were ceremoniously planted. These were planted by Professor T. Clear, Professor of Forestry, in memory of the late Professor M. A. Hogan, former Chairman of the Buildings Committee, by Dr. Thomas Murphy, President of the College, and by two former Presidents, Dr. J. J. Hogan and Dr. Michael Tierney.

QUOTATION

"The furnishing of additional (wood) raw material through fertilizers is an extension of raw material of more than ordinary importance, for the basic resource, unlike a mine, is renewable."

S. P. Gessel, T. N. Stoate and K. J. Turnbull: *The growth behaviour of Douglas-fir with nitrogenous fertilizer in western Washington. The second report.* Institute of Forest Products, College of Forest Resources. University of Washington, 1969.

Reviews

FORESTRY IN GREAT BRITAIN; AN INTERDEPARTMENTAL COST-BENEFIT STUDY. H.M.S.O. London. £1.25, 107 pp.

This very interesting study represents the most sophisticated effort so far at an evaluation of investment in plantation forestry in Britain. This review will not consider the sections of this report dealing explicitly with private forestry in the U.K. on the basis that discussions of such material would be of little interest to most Irish foresters.

Public investment in forestry is assayed in a cost benefit framework: valued benefits include wood and recreation outputs; in addition to the usual production costs the value of water foregone is included to comprise estimated costs. Costs and benefits are then discounted to the same point in time using a discount rate of 10 per cent, resulting in negative net discounted revenues (total discounted benefits—discounted costs) for each of the 3 sample areas studied (North Wales, South Scotland, North Scotland).

Measured *benefits* include wood and recreation outputs; a chapter has also been included concerning the local employment generated, and on the cost of this generation to the exchequer. Only employment "in the forest" and the service employment which it generates was considered, the logic being that (p. 72) "it cannot be assumed that in 50-60 years time there will be the present need for jobs in these areas." Likewise of course it cannot be assumed that there will *not* be the need for these jobs at that time or indeed much earlier, since the pulpwood outputs which are generated 20 years after the initial investment also generate employment. The derivation of the probability (e.g. 0.3-0.5) of underemployment persisting in rural areas 15-50 years from now and its application to estimates of employment "induced" in transport, processing and non basic sectors would have improved the analysis. As the authors demonstrate very effectively, forestry, as a capital intensive and labour extensive operation, has little value *per se* as a generator of regional employment; its premier advantage from a development point of view lies in its very strong forward linkage [*vide* the Fort William pulp mill in Scotland (Greig, 1971) or the Scarriff chipboard plant in Ireland (Lucey and Kaldor, 1969)]. If forward linkage is ignored, than forestry's most distinctive contribution as a generator of labour-intensive resource-based economic activity is likewise set at nought.

The authors feel that the import-saving effect of forest outputs does not warrant any weight in the public investment decision-making process, but they do incorporate in their study a "variant to the main case" where benefits are arbitrarily valued at 20 per cent above their measured value to reflect the import saving effect. Likewise "strategic" arguments in favour of forestry are dismissed on the basis that in the event of hostilities imports would only be interrupted for "a few months at most"; in this event the main supply limitation would be processing capacity rather than wood supply. As already mentioned, the *costs* considered included the usual production costs and the opportunity cost of water foregone as a result of forest plantation establishment.

The valuation of these costs and benefits gives rise to some interesting questions.

On the benefit side, it has been assumed that the "historic" (50 years) rise in "real" timber prices will not be maintained, and that current prices (in real terms) can therefore be used to value future wood production. This assumption is based on the premises that wood substitutes (steel, concrete, plastics) will prevent the prices of "final" wood products from rising, while advances in extraction, logging and transport technology will keep "per unit volume" costs from rising. Many other equally defensible scenarios can be outlined. A more realistic one in my opinion would go as follows; environmental forces[1] in both the U.S. and Canada will continue to limited the "effective" timber supply, by precluding logging entirely on some areas and restricting logging elsewhere through regulation of clearcut area size, slope of felling area, pesticides, herbicides and the like. These forces will also be felt in a more modified form in the Nordic countries and the USSR, while Japan will absorb an increasing quantity of Siberian wood. At the same time, the competitors for wood will come under much the same kind of increasing cost pressure. The steel and cement industries have serious pollution emission problems, and their reduction to "acceptable" levels will be reflected in higher production costs. Such costs will similarly be imposed on the hydrocarbon (oil) industry; plastics have the additional complication that they are not decomposable, and the resulting higher disposal costs are likely to be reflected ultimately in the consumer price. This latter problem is now considered to be of such significance that the U.S. paper industry is having second thoughts about the wisdom of encouraging

1. Including a desire for "pure" wilderness and natural areas, a concern with fragile ecosystems, erosion, water quality and aesthetic considerations.

paper-plastic composite products from which the organic (decomposable) component (paper) cannot be easily separated.[2] The net effect in Europe of these postulated forces could be fairly stable demand functions for wood-based products, with supply functions moving to the left, resulting in rising wood prices, the extent of the increase depending on relative supply and demand elasticities, i.e. a continuation of the historical price trend. This rather lengthy scenario is outlined not because of any conviction that it is uniquely correct, but rather to indicate the rather narrow scope of the price predictions analysis in the Treasury study.

To measure recreation and amenity benefits consumer surplus[3] per visitor day has been used, and it is assumed that this will increase in value at an annual rate of 5-10 per cent as a result of growth in population and income. The basis for this high growth rate is not documented, and although it does seem to fairly reflect experience in other countries.

The estimation of costs introduced a number of interesting concepts; land was valued not at its market price but at its opportunity cost to society under agriculture, which, when all of the subsidies have been removed yielded a zero discounted net value. Likewise the opportunity cost (shadow price) of labour engaged in forestry was estimated to be just under half of the present wage. This shadow price for labour seems to be inordinately low. The lowest labour shadow price derived from public water projects in the U.S. by Haveman and Krutilla (1968, pp. 76, 77, 82) estimated either by region or by project type amounted to 72.9 per cent of the market price for labourers, and this estimate was for an economy which "tolerates" a rate of unemployment much higher than that normally obtaining in the U.K. As forests mature they result in a loss of water to the local supply system, and this loss has been judged insignificant in Scotland, but priced at 5 pounds per acre in North Wales. The derivation of this estimate is not discussed.

The discounting of the costs and benefits at 10 per cent results in negative net discounted revenues even under the "best" conditions and these results elicit a set of forest management "recommendations", including shortening the rotation length, employing less intensive management, and using better sites. Only under the (rarely found) "best" management and site conditions does forestry

2. Dane (1972) has demonstrated that the social external environmental costs imposed by lumber production are less per dollar of output than for any "competing" construction material.
3. Provides an approximate measure of consumers' aggregate willingness to pay for a commodity.

show positive net discounted revenues.

The more general conclusion then is drawn that "new planting compares unfavourably with the hill-farming it replaces in economic resources and in Exchequer costs per acre," and that unless great weight is given to the generation of (p. 81), "slightly more local employment," then new plantings must be judged of doubtful social value.

The selection of a 10 per cent rate of discount in a sense predetermined this conclusion; the authors themselves point out (p. 49) that "it appears that only in the most favourable combination of climate and soil (possibly Chile or New Zealand) is a return of 10 per cent attainable." How has this discount rate been arrived at? The authors do not discuss its derivation, and we must assume that it has been determined elsewhere that 10 per cent represents British society's rate of time preference. A society's rate of time preference is defined at the rate at which it discounts future values in *real terms* in its decisions about present versus future consumption; if a society's rate of time preference is 10 per cent it theoretically will be "indifferent" about receiving 100 pounds now or 110 pounds one year from now in "real" terms. If the average annual rate of inflation were 8 per cent, this rate of time preference would imply that society would be indifferent between 100 pounds now and 118 pounds (approx.) received one year from now in "money" terms. This author suspects that instead of representing the social rate of discount in "real" terms, part of the 10 per cent rate is attributable to the current British high rate of inflation; some evidence for this view would be that the discount rate used by governments tends to be increased as the rate of inflation increases. This hypothesis obviously cannot be tested for this review but the authors of the study should certainly have included an appendix detailing the rationale for the selection of this 10 per cent rate, since, as already pointed out, its use predetermined their conclusions.[4]

Criticism of this cost benefit analysis has focused thus far on the exclusion of secondary benefits, the uncritical use of "present" prices to be applied to future yields, the very low shadow price adopted for labour and the very high discount rate employed. One might also question the position taken by the study group in regard to the balance of payments question; they observe that (p. 13) "the only sensible framework for such an analysis is to assume that the U.K. is able to maintain a satisfactory balance of payments position

4. *A priori* it is hard for this reviewer to accept that the "real" rate of return on private investment (i.e. the "opportunity cost" of government spending) in Britain averages 10 per cent.

in conjunction with the desired level of employment over the time span in question." The post-War empirical evidence suggests quite strongly on the other hand that high rates of unemployment are positively correlated with a strong balance of payments position and *vice versa;* if the study group had evidence to the contrary in favour of their "sensible" assumption, they should have produced it.

These criticisms lead to a more fundamental question; Is cost benefit analysis an appropriate method for making public policy decisions of this magnitude? Experience in the U.S. is illuminating in this regard: Cost benefit analysis became widely used as a means of evaluating public water projects after the 1936 Congressional Flood Control Act which stipulated that for a project to be regarded as "feasible" the benefits, to whomsoever they accrue should be in excess of the costs, and its use quickly spread to other non-water projects. Criticisms of cost-benefit analysis in the early years focused on the measurement difficulties (especially of benefits) and the difficulty of incorporating distributional considerations. More recently the ability of analysts to give proper consideration to environmental variables has been questioned. These misgivings have culminated in recommendations recently proposed by the Water Resources Council (1971)[5]; for each proposed plan a complete display of relevant *effects* should be produced. Among many others, effects would include the value of goods and services produced, and their associated "direct" costs, regional employment, income and its distribution, and environmental effects such as impacts on open and green space, wild and scenic rivers etc., as measured by environmental "indicators". The emphasis then is on the development of an *information system* which can be used in a multi-objective framework. It appears as though we have now come full circle; the desirability of compressing as many of the relevant variables as possible into a single efficiency criterion is no longer "officially" accepted. To be useful in a democratic society decision criteria must achieve broad acceptance from the groups involved. Cost benefit analysis has failed this test, and this probably explains the move to a more broadly based and less definitive approach to decision making in the public arena in the U.S. The Treasury team would perhaps have served the public better if they had shown the impacts of forestry investment in terms of variables such as rate of financial return, employment generated, balance of payments effects, etc., and allowed the decision makers to judge

5. The agency responsible for the planning of Federal and certain federally assisted water and land resource programs and projects.

the relevance or otherwise of the indicators selected [e.g. balance of payments, employment], although to be sure economists can help in this task. The incentive to dismiss as irrelevant (in the case of balance of payments) or to oversimplify (in the case of price projections) would thereby be removed, and the debate in the politicial arena could focus more on issues and less on the validity of various monetary valuations and assumptions.

Although this review has emphasized the negative aspects of the report, it has much to commend in it; for the first time, a conscientious and systematic effort has been made to delineate the role which public forest investment can play in British society. We may quibble about some of the assumptions and methods used but the study does at least attempt to examine the forestry sector from society's viewpoint. In this sense it stands as an indictment of British forestry planning, since any profession or organization presuming to manage hundreds of millions of pounds of publicly held assets has an obvious responsibility to indicate what return (in its broadest sense) this public is getting for its money, and why the investment should (or should not) be enlarged (or liquidated). If such had been done, the vacuum which encouraged the undertaking of the present study would have been filled, and I feel sure that public forestry in Britain would not now be on the defensive.

Frank J. Convery

REFERENCES

Dane, C. W. (1972). "The Hidden Environmental Costs of Alternative Materials Available for Construction." *Journal of Forestry* 70(12), December.

Greig, Michael A. (1971). "The Regional Income and Employment Multiplier Effects of a Pulp and Paper Mill." *Scottish Journal of Political Economy*, February.

Haveman, Robert H. and John V. Krutilla. (1968). *Unemployment, Idle Capacity, and the Evalution of Public Expenditures.* Johns Hopkins Press, Baltimore.

Lucey, D. I. F. and Kaldor, D. R. (1969). *Rural Industrialization.* Chapman, London.

Water Resources Council (1971). "Proposed Principles and Standards for Planning Water and Related Land Resources." *Federal Register* Part II, 36(245). Dec. 21st, pp. 24144-24194.

A NATURAL HISTORY OF IRELAND by Christopher Moriarty. Mercier Press, Cork. £1.25 (paperback).

This small book is the fourth in a series of books describing the natural history of Ireland. The others appeared in 1188, 1852, and

1950. Its author claims for it only that "It is a very brief outline of the subject and is written for the general rather than the specialist reader." After a short historical introduction the first half of the book is devoted to a general ecological description of the country in terms of eight major habitat groupings which range from "Cities, towns and suburbs" to "Coast and sea". In the second part the counties are described individually in terms of their wild-life habitats and guidance is given on where the more interesting plants and animals may be seen. No maps are included but two-figure map references are used throughout and we are assured that all places named are to be found on the O.S. $\frac{1}{4}$ inch sheets. There are 192 pages including a detailed 17-page index and 38 photographs depicting a selection of plants and animals, and a few of distinctive habitats.

Despite the severe limitation of size a brave attempt is made to be inclusive, to take account of the wild-life contribution not only of the more natural habitats but also of agricultural land, coniferous plantations, and even urban areas. One result of this is that only a very crude habitat or landscape subdivision is possible. Agricultural landscapes are either "rich" or "poor", and the same goes for fresh waters. The author clearly has a difficult task and is so busy compressing his explanations into a few words and setting down his many and varied snippets of information that he tends to forget his readers. This results in tedious repetition and marked inconsistency. Those readers who need to be told that cereals are planted as seeds and potatoes as tubers are unlikely to make much of the passing references to merlins and nightjars, or lampreys and pipefish. Animals, especially the birds and fishes, are given better coverage than the plants; a reflection no doubt of the author's own special interest and knowledge. Errors must be expected in a book of this kind. Among the minor ones are incorrect map references and a startling loss of an 'O' in line 2 of Chapter 5. More serious are the subtle errors and half truths included in many of the more general statements and explanations. Farmers and foresters in Leitrim and Fermanagh (to name only two) are not likely to go along with the statement that, "The drift material drains well". The explanation of forest destruction and the spread of bogland is sadly misleading.

To make the general public aware of the variety of wild-life habitat in Ireland and to convey some impression of the wealth of beauty and interest to be found there is a major task in itself. To achieve enough understanding for people to go on to explore and interpret for themselves is quite another. Foresters, and others who already have an environmental awareness and some background

knowledge of natural history are unlikely to find in this book much to advance their own education or to use as a model in their growing role of interpretation. Beginners are more likely to be impressed and stimulated by the book than educated by it. This may not be all that its author hoped for but to achieve even such limited success would be highly creditable.

R. E. Parker.

TIMBER MEASUREMENT FOR STANDING SALES USING TARIFF TABLES. By G. J. Hamilton. Forestry Commission Booklet No. 36. H.M.S.O. 14p.

This booklet gives a little of the basic theory behind the tariff (local volume) tables and much practical advice on their use.

Tariff tables presented previously in the British Forestry Commission's Forest Record No. 31 and Supplement No. 1 are available since 1956. The system has been tested and proved to be a consistent and precise method of measuring standing timber. It is applicable to both thinnings and fellings. Up to now, there have been limitations to the use of the tariff system in stands of widely varying composition. These have now been removed, but to attain a reasonable level of precision, sampling must be adjusted to suit the circumstances. In fact a key is provided so that the most appropriate of three different sampling schemes may be selected. Notes on the key are included. An interesting one is the possible grouping of closely related species in early pole stage measurement.

Field work procedure, method of calculations, sources of error, checks and measurement conventions are dealt with fully. Notes on team organisation, line thinnings and the procedure to follow when there is an insufficient number of volume sampling trees measured, are included. A point of field work procedure which is questionable is the scribing of breast height and mid-diameter points. This can affect measurement if checking is necessary. If a scribe is to be used, two marks, one just above and the other below the point of measurement might be better practice and prevent tapes from becoming coated with resin in measurement of conifers.

Assortment tables, which give volumes to various top diameters expressed as a percentage of volume to 7 cm top diameter, are used to give an estimate of volume in desired top diameter categories instead of volume categories based on breast height diameter.

This inexpensive, well presented publication is highly recommended.

Thomas J. Purcell

FOREST FENCING. H. W. Pepper and L. A. Tee. Forestry Commission Forest Record No. 80. H.M.S.O. 35p.

Fencing is a necessary forest operation, usually expensive, which requires careful initial planning if need and expense are to retain correct relativity. This booklet provides a sound basis for planning and brings together details of up-to-date materials, tools and methods. Where the written word cannot provide the reader with adequate information, full use is made of illustrations and photographs which show tools, work methods and specifications.

The introduction of spring steel wire as a replacement for the traditional mild steel wire is fully covered and its use is recommended as there are substantial overall savings if the correct tools and work methods are used.

The booklet can be recommended to anyone contemplating fencing, amateur or professional, as it is one of the most comprehensive publications on the subject.

W. J. Johnston

NURSERY PRACTICE. J. R. Aldhous. Forestry Commission Bulletin No. 43. H.M.S.O. £1.50.

For many years forest-nursery managers have been waiting for a publication covering all aspects of raising forest planting stock under conditions prevailing in these islands. This bulletin fulfils the need adequately being, as it is, a summary of a large number of experiments carried out by the Forestry Commission, Research Division, together with the practical experience of the large-scale production of young trees.

It was prepared by Mr. Aldhous but many people on the Forestry Commission's Research staff and others have helped to provide material for various chapters and the result is this well-balanced work full of useful information for the nursery manager.

There is a central inset of thirty one fine black and white photographs, twenty-five of which are full-page size ($24\frac{1}{2}$ x $18\frac{1}{2}$ cm), in addition to fifteen figures. Measurements given are imperial followed by their metric equivalents.

The bulletin covers all the advances that have been made since the late forties and early fifties such as the use of herbicides (of which Simazine is still the most important), mechanisation, the improvement in the physiological quality of seed resulting from improved methods of handling and storage, and the use of grit for seed covering.

Nursery soils and plant nutrition occupy twenty pages of text. Older Foresters in this country will remember that up to the early fifties the direct application of inorganic manures to young trees was regarded as useless or even harmful and nutrients were supplied through green-manure crops. This view also obtained in Britain and it is pointed out that in agricultural rotational cropping is soundly based, e.g. if ground is cropped repeatedly without a break the yield of cereals decreases progressively due to increase in soil-borne diseases such as 'take-all'. It is clearly stated, however, that experiments and practical experience have shown that, given adequate nutrition and a suitably acid soil, continuous cropping with Sitka spruce seedlings can be carried out successfully.

The question of green cropping, as opposed to fallowing, is discussed and it is interesting to note that in 1963 in the Forestry Commission nurseries where the rotation was broken in some way out of thirty-six nurseries in England and Wales only one used green crop while all nineteen in Scotland did.

Here as home we have tended to steer a middle course, and where foresters claimed they saw value in green cropping, such as its beneficial effects on soil structure brought about by whatever sticky substances are produced in the breaking down of the green crop following ploughing in, it was carried out, while others seeing the effect of fallowing on weed control chose the latter. Most use a combination of both.

In discussing the effects of green cropping on the humus content of the soil, it is stated that there is evidence from agriculture that the nitrogen released by a rapidly decomposing green crop may result, not only in the green crop's decomposition, but also in the breakdown of some of the organic matter present in the soil prior to the green crop.

In a short article in 'Tree Planters' Notes' (United States Department of Agriculture, Forest Service, October 1960) by H. A. W. Knight, Research Division, British Columbia Forest Service, this reviewer read of a similar experience where only inorganic manure was used in fertilising green-cropping trials in a forest nursery.

This Forestry Commission Bulletin on the whole is notably sensible in its approach and at the price is very good value.

There is an excellent index.

J. J. Deasy

OTHER PUBLICATIONS RECEIVED

Faculty of General Agriculture. Research Report 1972. University College, Dublin. 50p

FORESTRY COMMISSION PUBLICATIONS

Fifty-Second Annual Report and Accounts 1971-1972 ... 75p

Report on forest research 1972 ... ... £1.60

Bulletin No. 46. *Forest of Dean day visitor survey* by R. J. Colenutt and R. M. Sidaway 60p

Forest Records:

No. 83. *The pine shoot moth and related species* by T. M. Scott 14p

No. 84. *Winter temperatures and survival of the green spruce aphid* by C. I. Carter 7p

No. 85. *The coal tit* by A. J. Deadman 14p

Booklet No. 38. *Common trees* 8p

Research and development papers (unpriced)

No. 87. *Production and use of ball-rooted planting stock in Sweden and Finland* by A. J. Low and R. M. Brown.

No. 88. *Dissemination and application of research information in the field* by O. N. Blatchford.

No. 89. *Formulation and Implementation of Forestry policy* by D. R. Johnson.

No. 90. *Planning and development of markets for man-made forests* by F. C. Hummel and J. L. Davidson.

No. 91. *Silviculture and good landscapes in British Forestry: the improvement of planning and practice* by M. H. Orrom and A. F. Mitchell.

No. 92. *The special contribution of forests and woodlands to recreation in an industrial society* by J. A. Spencer and R. M. Sidaway.

No. 93. *Valuation of non-wood benefits* by A. J. Grayson.

Society Activities

OUTDOOR MEETINGS SUMMER 1972

Date	Location	Leader and Topic
21 May	Devil's Glen, Co. Wicklow	Mr. P. F. O'Kelly: Management of middle aged crops; amenity area and usage.
4 June	de Vesci Estate, Abbeyleix	Mr. J. Pfeifer: Oak area regeneration and management; arboretum specimens.
9 July	Knockrath, Co. Wicklow	Dr. P. M. Joyce: Regeneration by stool in sessile oak.
9 July	Glenveigh, Co. Donegal	Mr. Paul Hand: Sessile oak regeneration and red deer habitat.
27 Aug.	Killure, Ballinasloe, Co. Galway	Mr. E. O. P. McGuinness: Plantations on reclaimed peatland.
10 Sept.	Killyon, Dunfierth, Enfield, Co. Meath	Messrs O. V. Mooney and J. J. Maher: Plantings on cutover and on high midland peat.

The Annual Study Tour, 12—16 June, based on Bantry, Co. Cork was reported in *Irish Forestry* Vol. 29, No. 2.

INDOOR MEETINGS

Professor Kenneth P. Davis, of Yale University, U.S.A., addressed the Society 19th September 1972, in Dublin. His subject was the Principles of Land Use.

On 1st December 1972 Mr. T. McEvoy, Inspector General, Forest and Wildlife Service, gave an illustrated account of his visit to the Argentine in October 1972. Accompanying the Minister for Lands and the Secretary of the Department to the World Forestry Congress, Mr. McEvoy had the opportunity of seeing a cross section of the country in an organised itinerary. Keen camera work and a forester's eye added a great deal to a story of a forestry programme which was really only at the first faltering stages of implementation. Mr. McEvoy dealt ably with many and enthusiastic questions and the meeting concluded with a warm vote of thanks.

Mr. Wm. E. Matthews, Managing Director of Southern Tree Surgeons Ltd., gave an illustrated talk on Tree Surgery and Maintenance on 23rd February 1973. Showing a great number of slides to illustrate various problems and situations where damage had been done, the desirability of skillful management and expert treatment was clearly underlined. Mr. Matthews showed that intervention at an early stage often saved severe

treatment later. With a greater awareness of trees as elements contributing so much to an environment, Mr. Matthews's talk emphasised the increasing need for skilful arboriculture in its own right.

J. F. DURAND

New Members

Technical:— Messrs R. Browne (Castlebar), S. Carney (Castlebar), T. P. Comer (Tuam), M. P. Davoren (Camolin), M. Donnelly (Boyle), T. Duggan (Mountrath), D. Egan (Kerry), T. McCarthy (Kenmare), S. O'Canainn (Castlebar), J. J. O'Shea (Cork), T. Prendergast (Fermoy), P. Wilson (Longford).

Associate:— Miss C. Hall-Dare (Bunclody), Messrs A. W. Ennis (Cavan), G. Kidney (Enniskillen), J. Kral (Dublin), G. H. Pickles (Creeslough), B. Rogers (Dublin).

—o— —o— —o—

ERRATUM

In the paper, "The response of Sitka spruce to sulphate of ammonia and ground rock phosphate on peat" (*Irish Forestry*, Vol. 29, No. 2, pp 14-28), coefficients of variation (CV) should read as follows:

Table	Years				
	1967	1968	1969	1970	1969-70
1	22	18	21	22	13
2			19		
4	14	15	12		
6	24	24	19		
7	31				
8	11	13	10		
5	N content CV = 34		K content CV = 15.		

More Highland Bear Forwarders are in action now than all other makes put together

Fifteen years ago the first Highland Bear went to work in the forest. Today they are at work in every forest area in the U.K. The great success of forwarders using Highland Bear loaders speaks for itself. There are more of them in use in Britain today than all other makes combined. Because forwarders using the Highland Bear lead the field James Jones & Sons who make them have built up a unique experience on this type of equipment under the whole range of forestry conditions. That experience goes into the machinery you use. The Highland forwarding unit including tractor and Highland Bear crane can be supplied for around £3,000. The increase in output and/or substantial savings of labour costs will make this investment really pay. For full details of Highland Bear Equipment contact us. You'll like what you hear.

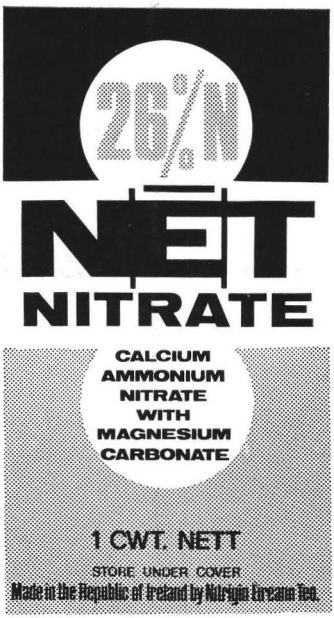
Points in your favour

Five Highland Bear grapple cranes are available reaching from 13ft. to 25ft rated from 2 to 5 ton metre capacity.
We can build a forwarder around your own tractor.
The loader can be detached to release the tractor for other work. The mountings in no way interfere with routine tractor servicing.
Eight James Jones service depots throughout the U.K. ensure fast, reliable service.

James Jones & Sons Limited

P.O. BOX 35, Larbert, Stirlingshire.
Tel : Larbert 2241 Telex : 778583

GET GRASS GROWING AGAIN



Published in the interests of better farming through planned fertilizer usage by Nitrigin Eireann Teoranta, Arklow.

HINO CARRIES THE TIMBER

LOADS IN EUROPE

ABOVE ONE OF THE MANY HINO MODELS AS USED THROUGHOUT THE INDUSTRY IN IRELAND

SOLE CONCESSIONAIRES FOR IRELAND :

J. HARRIS (ASSEMBLERS) LTD.

CLOGHRAN, CO. DUBLIN

PHONE : 379261

The truck that's been missing

Ireland long has needed a big truck with exceptional qualities of superb design, high job-rating, long life and durability.

A truck such as SCANIA.

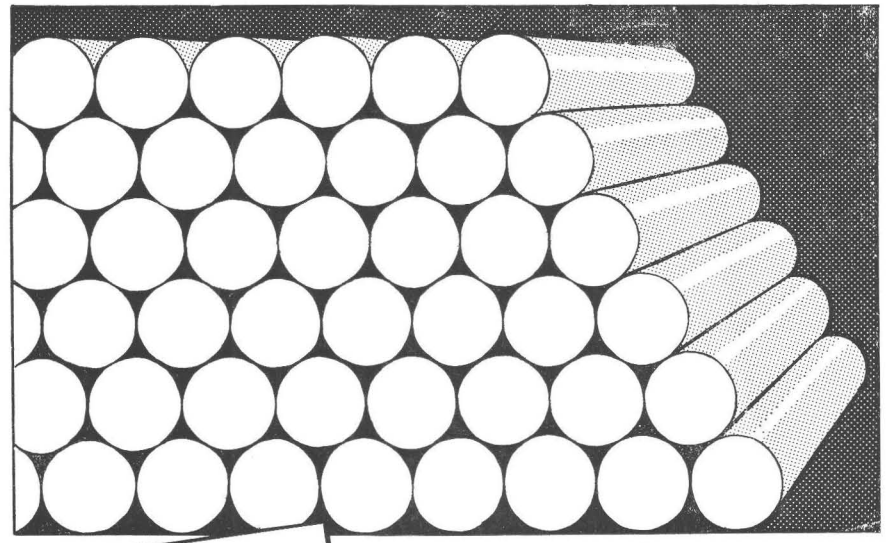
McCairns Motors Ltd. are happy to announce that Scania commercials are now available in Ireland and early deliveries can now be made.

So the truck that has been missing no longer is. Scania quality is here. Such quality as is exemplified by the 110 Super — utterly magnificent, superbly powerful, doggedly reliable.

SCANIA
McCAIRNS
MOTORS LIMITED

McCAIRNS MOTORS LTD., DUBLIN, GALWAY, AND WATERFORD.

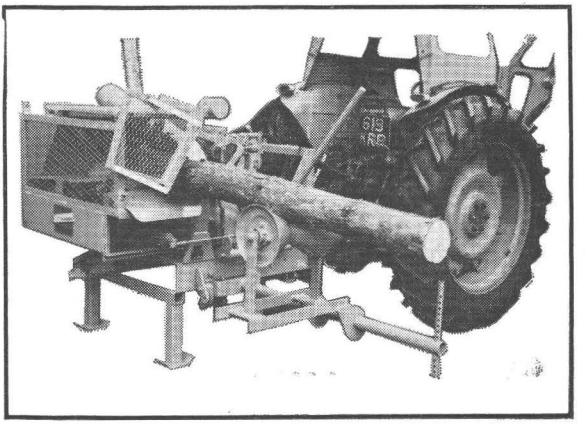
Domas



STACK UP... THE ADVANTAGES

of a Cundey Continuous Feed De-Barker

1. Takes all timber diameters from 2½in. to 10in. Self-adjusting.
2. Can be specially adapted to cope with 1½ in. diameter timber.
3. Takes most types of timber, particularly softwood.
4. Can be powered by Petter or Lister Diesel, tractor or electric drive.
5. British designed with readily available spare parts.
6. Stake pointing attachment available on all models.
7. Recognised safety guards available.



Speedy, Reliable, Economical.

CUNDEY DE-BARKER

for details please contact:

CUNDEYS LIMITED
SALES DEPT.,
ALFRETON, DERBYSHIRE.
Tel: ALFRETON 2031

£35.00 an acre for:

TREE PLANTING

SEND NOW FOR INFORMATION BOOKLET

£35.00 an acre — that is the basic rate for commercial tree planting. Additional grants can be obtained for scrub clearance and the planting of hardwoods. Free technical advice is also available . . . Make your waste land pay.

To: FOREST and WILDLIFE SERVICE, Dept. of Lands, Dublin 2.
Please send your booklet "Grants for Private Planting".

Name .....

Address .....

.....

.....