Chapter (non-refereed)

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3. TREES IN TOWN AND COUNTRY

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Compared with most other European countries, the United Kingdom lacks forests, but is well endowed with amenity trees, a result of large scale clearances over many centuries being offset to some extent by small scale plantings for shelter, estate amenity and the delimitation of fields (Good, 1976). However, recent fundamental changes in agriculture, with the amalgamation of small fields into larger units, have resulted in the loss of hedgerows and, in many instances, the removal or neglect of small areas of woodland (Westmacott & Worthington, 1974). Inevitably, public interest has been aroused and to some extent fostered by the current devastating attacks of the aggressive strain of *Ceratocystis ulmi* (Buism.) Moreau, the fungus causing Dutch elm disease (Brasier & Gibbs, 1973). How should our resource of amenity trees be sustained? What problems have to be overcome in relation to site conditions, species selection, maintenance, vandalism and the provision of planting stocks by the horticultural trade? Before these questions can be answered, we need a detailed understanding of the nature of the resource, its size and composition by age and species. So far, detailed surveys have been limited to the Lothian region.

1. Survey of the Lothian region

The survey was done in 2 parts (a) the city of Edinburgh during 1972 (Last *et al.*, 1976) and (b) the remainder of the Lothian region, including the districts of East, Mid and West Lothian, in 1974-75 (Good *et al.*, 1978). Forestry Commission woodlands, grant-aided woodlands, worked coppice, commercial orchards and hardy-stock nurseries were omitted.

1.1 Site selection

The city of Edinburgh was considered in 2 parts, residential and non-residential.

(i) Residential—From a cursory survey, it was obvious that the distribution of trees was overwhelmingly influenced by social considerations and was not strongly related to traditional site factors such as soil type and aspect. As a result, residential areas were divided by owner-occupancy into 4 categories using data from the 1966 census (HMSO 1968) *viz* areas with 0-25, 26-50, 51-75, 76-100% owner-occupiers (Waugh, 1973). Twelve localities were selected at random within each of the 4 occupancy categories, each locality, usually delimited by roads, being not less than 2 ha and not more than 7.

(ii) Non-residential—Excepting cemeteries, private parks and public utilities, non-residential areas of Edinburgh were identified on 1/24000 scale aerial photographs (Meridian Air Maps, 1971), measured and allocated to one of 5 classes: (1) tree-lined parks with trees restricted to the perimeter and/or verges alongside roads, (2) open parks where the few trees were small, (3) golf courses where the few trees, like those in open parks, were small, (4) park-lands where trees are open-grown and scattered, (5) woods where the many trees create a woodland character. In total, 21% of the 929 "non-residential" ha was observed.

East, Mid- and West Lothian. These districts were divided into urban and rural areas, the latter being subdivided into upland and lowland, above and below the 500 ft (160 m) contour. A sampling system based on conveniently delineated sectors in urban areas (burghs), and 1 km National Grid squares in rural areas was used. Total enumerations were made of randomly selected urban sectors, whereas, in rural areas, each selected 1 km square was divided into 100 strips each 20 m wide, 50 being orientated N/S and the other 50 in an E/W direction. Two of these strips were chosen at random for survey, within each square, giving a 4% coverage.

1.2 Enumeration

Trees were defined as perennial woody plants with main stems taller than 1.8 m (6 ft). They were usually categorised into species, but, in some instances, to species-aggregates with 0.2% remaining unclassified. Diameters at breast height (1.3 m) were also recorded. In the Edinburgh survey, a utility assessment was made of those stems exceeding 30 cm, using 3 categories, non-utilisable, if less than 1.8 m of clear stem, if stem form was very bad (fluted, twisted, buttressed...), if evidence of microbial decay..., utilisable, if 1.8 m or more of clear stem without major defects of the type described for non-utilisable, good quality, if 1.8 m of clear stem without defects.

1.3 The resource

The Lothians are not thought to be heavily endowed with amenity trees compared with other parts of Britain (Locke, 1970), but, even so, and allowing for the sizeable statistical error, the total of 6.7 million trees (± 27%) represents a very considerable resource, equivalent to about 10 trees per head of population and 36 trees ha^{-1} (Table 2).

TABLE 2 Distribution of amenity trees in the Lothian region (1972-75) (Good *et al.*, 1978)

Land categories	Total area km^2	Area sampled km^2	No. of trees in samples	Estimated total no. of trees (Millions)	Mean no. per ha
D. Burghs (A)	232	11.2	73000	1.4 ± 0.37	59
Lowland rural (B)	741	4.2	17000	3.2 ± 0.89	43
Upland rural (C)	904	4.5	10000	2.1 ± 0.59	24
Region (A+B+C)	1877	19.8	100000	6.7 ± 1.84	36

Amenity trees were found to be unevenly distributed, greater concentrations (trees/ha) occurring in towns than in rural areas, where the lowlands are predominantly arable and the uplands, sheepwalk. On average, broadleaved trees outnumbered coniferous trees by a factor of 2.5. As might be expected the contrast was greater in the burghs (84% broadleaved: 16% coniferous) than in upland rural areas where conifers were relatively more abundant, attaining 35%, a proportion still considerably below the 50% and 95% of conifers in grant-aided woodlands and Forestry Commission plantings. Overall, sycamore, hawthorn and Scots pine each accounted for more than 10% of the trees of the Lothian region. There are, however, conspicuous differences among the different land categories (Table 3). The introduced and fecund sycamore appears, like wych elm, to thrive in urban and lowland situations. However, in upland areas, and in keeping with comparable situations elsewhere in Scotland, its numbers are greatly decreased compared with those of birch, which is the commonest type of tree, closely followed by planted Norway spruce. Unlike sycamore and birch, the relative

TABLE 3 Estimated numbers (in thousands) of the 10 commonest trees in the burghs and lowland and upland areas of the Lothian region when surveyed in 1974-75 (Edinburgh excluded) [Good *et al.*, 1978]

	Land categories							
	Burghs		Lowland rural		Upland rural		Total	
Rank in descending order of frequency	Types of tree	Estimated number of trees	Types of tree	Estimated number of trees	Types of tree	Estimated number of trees	Types of tree	Estimated number of trees
1	Sycamore	41 *(18.4%)*	Sycamore	470*(15.3%)*	Birch	330*(15.6%)*	Sycamore	630*(11.6%)*
2	Wych elm	18 *(8.4%)*	Hawthorn	410*(13.3%)*	Norway spruce	320*(15.1%)*	Hawthorn	600*(11.1%)*
3	Hawthorn	16 *(7.3%)*	Scots pine	340*(11.1%)*	Scots pine	220*(10.7%)*	Scots pine	570*(10.5%)*
4	Elder	14 *(6.5%)*	Wych elm	230 *(7.4%)*	Hawthorn	170 *(8.1%)*	Birch	430 *(8.0%)*
5	Birch	11 *(5.1%)*	Sitka spruce	210 *(6.7%)*	Ash	170 *(8.1%)*	Norway spruce	400 *(7.3%)*
6	Rowan	10 *(4.4%)*	Ash	200 *(6.4%)*	Beech	150 *(7.0%)*	Ash	380 *(7.0%)*
7	Oak	10 *(4.4%)*	Larch	200 *(6.4%)*	Sycamore	120 *(5.5%)*	Wych elm	350 *(6.5%)*
8	Flowering cherry	9 *(4.2%)*	Elder	190 *(6.1%)*	Wych elm	100 *(4.7%)*	Larch	280 *(5.2%)*
9	Ash	9 *(3.9%)*	Beech	120 *(4.0%)*	Willow	100 *(4.7%)*	Beech	270 *(5.0%)*
10	Apple	8 *(3.4%)*	Willow	120 *(3.8%)*	Larch	80 *(3.8%)*	Sitka spruce	250 *(4.6%)*
	Others	75 *(34.0%)*	Others	600*(19.3%)*	Others	350*(16.7%)*	Others	1250*(23.2%)*
	Total (thousands)	200*(100%)*	Total	3100*(100%)*	Total	2100*(100%)*	Total	5400*(100%)*

* Percentages computed for vertical, within land category, comparisons.

abundance of Scots pine in rural areas was not affected by altitude, being the third commonest tree in both situations. It was, however, conspicuous by its absence in urban localities. Oak was relatively more important in the burghs than in the rural areas, although it was nowhere plentiful.

Of the 1.4 million trees in burghs, 0.9 million occurred in Edinburgh with 71,000 in streets and public parks and 820,000 in gardens. The latter, as already mentioned, were strongly influenced by social factors. Numbers increased from 20 ha^{-1} where home ownership ranged from 0-25% to 115 ha^{-1} where most houses were owner-occupied. Street trees were relatively important where few houses were owner-occupied, forming 23% of the total, but only 1% at the other end of the scale of home ownership (Plates 6 and 7).

Possibly reflecting social attitudes, the numerically important apple (domestic and crab), lilac, flowering cherry, rowan, cupressus and laburnum of Edinburgh were replaced in more rural burghs by sycamore, wych elm, hawthorn, birch, oak and ash (Table 4).

TABLE 4 Estimated numbers (in thousands) of the 10 commonest trees in Edinburgh compared with those in other burghs of the Lothian region (1972-75) (Good *et al.*, 1978).

Edinburgh		Other burghs	
Apple, domestic	140	Sycamore	41
Lilac	81	Wych elm	19
Flowering cherry	66	Hawthorn	16
Sycamore	65	Elder	14
Rowan	56	Birch	11
Cupressus	45	Rowan	10
Apple, crab	44	Oak	10
Beech	41	Flowering cherry	9
Laburnum	40	Ash	9
Birch	37	Apple	8

NB The 10 commonest trees account for 64% of the total in Edinburgh and 66% of those in other burghs.

When diameters at breast height (dbh) were arranged in 5 classes, it was found that there were more small (0-20 cm) than large trees (> 20 cm) (Figure 8). However, these data reflect not only differences attributable to age but also innate differences associated with different species. Thus apple, blackthorn, common alder, etc....never exceeded 40 cm dbh, while maples, cotoneaster, Douglas fir, elder, etc ..., were always less than 80 cm dbh, a size sometimes exceeded by ash, cedar, horse-chestnut, etc. On closer examination of individual species, it appeared that the size class distributions of species such as sycamore and ash would ensure their conservation, but this relationship was not observed for other species, including oak and lime. This imbalance was particularly noticeable in parks, where virtually all Scots pine were larger than 20 cm dbh. In hedgerows, there was a dearth of small oaks and wych elms (even before the advent of Dutch elm disease), contrasting with less extreme size class distributions of beech and ash. Could it be that the more successful beech and ash, unlike wych elm and oak, are better able to withstand modern methods of management involving repeated machine trimming?

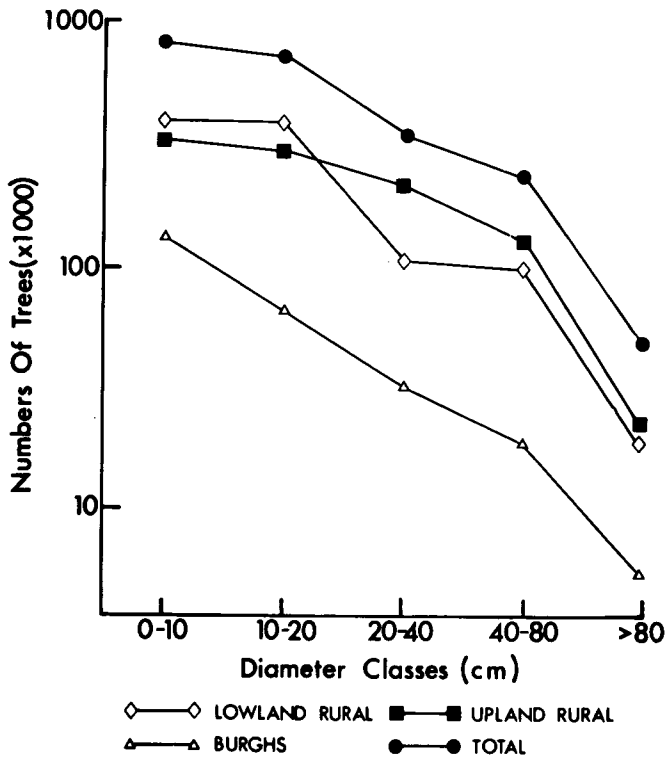

Fig. 8 *Frequencies of diameter classes among trees in different land categories of the Lothian region (Good* et al., *1978).*

Assessments of utility were confined to trees in Edinburgh greater than 30 cm in diameter (dbh), 73,000 of the total of 1 million. Of these trees, 11%, 78% and 11% were graded of good quality, utilisable and non-utilisable, respectively. As it happens, sycamore and wych elm together accounted for 66% of the trees larger than 30 cm in diameter, a proportion suggesting that the visual amenity of Edinburgh may be seriously impaired if its elms are stricken by Dutch elm disease– the really significant trees, in a landscape sense, are of too few species.

2. Implications

There is a large tree resource in the Lothian region, whether judged in terms of amenity, fuel or processable timber. Doubtless, this finding has its parallels elsewhere in Britain. The resource needs to be conserved, not preserved, and positive action should be taken to ensure conservation. However, the development of a fully integrated programme of management (to sustain) is sometimes vitiated by problems attributable to land ownership. Ways must be found of gaining the continuing support of private and public owners, and of reconciling agricultural and forestry interests with those of nature conservation, landscape, general amenity and timber and fuel production. It may be possible to conceive a management plan for trees in a city such as Edinburgh by attempting to reconcile these interests with the attention being paid to the possible use, of some, for timber or fuel. Experience of Dutch elm disease should be sufficient to stress the need for species diversity to minimize the calamitous landscape effects that occur when a tree species becomes severely depleted. At the same time, management plans should make provision to allow successional plantings, a procedure that would incidentally hasten conservation in contrast to the imposition of preservation, often by Tree Preservation Orders.

Hedgerows are an important component of lowland landscapes in the Lothian region and of much of Britain, having particular significance in intensive arable areas, where woodlands, scrub and parkland trees are few in number. It might be expected, as has often been argued, that trimming would preclude regeneration; in the event, this appears to be true for oak and wych elm, but appreciable numbers of beech and ash saplings seem to develop. The strong apical control in beech and particularly in ash leads to the rapid development of a few strong shoots which may develop into substantial saplings between cuts, whereas oak and wych elm generally respond to trimming by producing masses of competing shoots.

The parks or 'policies' (planted areas surrounding country mansions, mostly landscaped in the 18th and 19th centuries) are an important feature, albeit limited in extent, of the Lothian region. There is, however, good reason to question their management, and of those elsewhere in Britain, because their continued beauty could be in jeopardy without some semblance of successional planting. (Plate 8).

Before really effective management of amenity trees can be instituted, much more needs to be known about their biology. Whereas much is known about the growth of a limited variety of trees cultivated in plantations, we are virtually ignorant of the growth of the many species of amenity trees, each of which may be nurtured in a diverse array of sites. At present, life tables are being prepared for some species, linking life expectancy with the relation between age and size. But perhaps more important than this is the need to win the support of, and bring together, all sections of the population, often with apparently conflicting interests. With this support the problems of establishing programmes of sustained management are lessened. The aim should be a proper transfer of interest from preservation to conservation, a change which would incidentally necessitate successional thinnings, so releasing a supply of wood, a renewable, but admittedly restricted, source of timber and fuel.

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