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LANDSCAPE AND TREES IN CANBERRA.

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THE ORIGINAL SITE.

At the time of settlement Canberra was a treeless plain surrounded by wooded hills. A very sharply defined boundary between trees and grassland existed, which followed quite closely, the 2,000 ft. contour. Various explanations have been offered for the lack of trees on the plain. There is little doubt that this was the virgin condition of the land as a survey in 1936 by Heddle of a section which is now part of the Aerodrome, shows clearly a tree boundary adjoining open plain. There is botanical evidence which also definitely indicates that treelessness was not the result of white settlement, nor, indeed, of the activity of the aboriginal population. It is a condition which is a common feature on the Southern Tablelands and is characteristic in general of cold, rather dry areas. In a climate like that of Canberra, with a rainfall of 22 inches and a mean minimum temperature of the coldest month of just over 32 deg.F., and in colder areas, the broad valley bottoms such as that in which Canberra is situated are somewhat drier than the surrounding country, due to rain shadow effects, and they are also considerably colder due to cold air drainage. The latter condition is well enough known, and results from the slow movement of colder air from the higher ground to the valley bottom, and its retention there overnight. This is especially a feature in spring and autumn, and results in a marked temperature inversion as one ascends from the ground to the flat areas. This is, of course, well known in orcharding areas where various devices have been produced to blanket the area or, alternatively, to circulate the air to prevent damaging frosts.

The immediate environment of Canberra, therefore, is a rather difficult one for tree growing. Many species which easily endure the cold of Canberra, find it too dry in summer, and on the other hand, species which normally grow in drier areas,

are generally cut by frost in winter. The selection of suitable plants for landscape development has therefore been a somewhat difficult problem, and it has been only by the use of satisfactory techniques in establishment and maintenance that the rather good variety which at present exists in Canberra, has been maintained.

Another complicating factor is that most garden cities on which the general principles have been worked out for this kind of development, have been situated in climates substantially different from that of Canberra, and the plant material which must be used here, can be expanded only by introductions from areas which hitherto have not contributed to the gardens of Europe and North America, and in which the towns have not been developed as garden cities and without much tree planting.

The effect of settlement on the original Canberra site, was firstly to result in a considerable amount of clearing and ringbarking of standing trees in the surrounding country. This, however, was not as severe as in many other localities nearby on the Southern Tablelands, because of the existence of substantial, open grassy paddocks which were suitable for grazing. Nevertheless, it was considerable, and many of the surrounding hills were in an unsatisfactory condition at the time the area was set aside for the seat of Government. Grazing was the general land use, which had already resulted in an appreciable decline in soil fertility due to overgrazing, & a rabbit plague had developed. In the general landscape there was a few introduced trees, principally Lombardy Poplar, Weeping Willow, False Acacia and a few kinds of Pine. A quite notable collection of exotic trees had also been built up at the old Duntroon homestead.

THE FIRST STEPS.

The first steps which had a bearing on landscape development were the purchase of the land by the Commonwealth, and the elimination of rabbits. These two actions were absolute necessities for effective park development.

Another basic work was the introduction from all sources then available, of a wide range of native and exotic trees for testing for use in the development of the future city. This work was done in very considerable detail and was ably organised by the late Mr. C.J. Weston, who was the first Superintendent of Parks and Gardens in Canberra.

The second major policy decision was the adoption of a plan for the city and of a management plan for the use of the surrounding lands.

The first point in the condition of tenure in grazing leases, to which most of the land outside the city area was committed after purchase, made it an obligation to preserve all existing trees so that further loss by ringbarking and clearing, was prevented. At the same time the damage to some of the prominent hills was repaired and three means were very successfully employed to do this.

a. Mt. Stromlo.

Here a pine plantation of Monterey Pine was established which, in 1926, was handed over to a separate Forestry Section, and is now a commercial plantation of considerable value, which at the same time figures prominently in the landscape as a pine-clad hill.

b. Mt. Mugga and Mt. Russell were planted with native eucalypts and a satisfactory tree cover was established on them.

c. On Mt. Majura there was a reserve still present

of seed trees of Sheoak (*Casuarina stricta*) and by the simple means of the elimination of rabbits and grazing successful regeneration of this species was achieved and the hill quite well covered with vegetation with a little added supplementary planting.

The next main item was the provision of shelter belts and windbreaks, partly inside and outside the city design, and Westbourne Woods is a good example of informal planting of clumps of trees to provide general shelter, whereas Haig Park is an example of a formal windbreak established in this way.

The effect of tree planting in general in the city has been very marked, as a simple comparison between the wind at the Aerodrome and in the centre of Canberra shows. Measurements made by the Commonwealth Forestry and Timber Bureau indicate that the reduction in wind velocity at the ground as a result of tree planting in the past 30 years, is probably about 25%. The effects of this on the immediate climate are obvious, and the benefits to the city as a whole as a place in which to live, considerable.

DEVELOPMENT OF THE "GARDEN CITY."

Once the plan had been accepted and put into operation, some striking innovations in design were introduced. These have become rather more frequent in the ensuing 30 years, but perhaps, apart from the liberal provision of open space, partly for recreation and partly to contain those trees which are essential for the framework in the built-up city, the removal of overhead wires and the establishment of hedges in streets, were the main departures from usual practice.

The elimination of overhead wires from streets was made possible by the publicownership of all land which permitted without complication, the installation of electric and telephone services through the centre of residential sections. This has meant that a much wider variety of street trees could be

employed in Canberra than would otherwise be the case, and moreover, these trees, when grown, have a much more satisfactory appearance.

The establishment of uniform hedges which have been a prominent feature in the street architecture, was also made possible by the maintenance of these hedges by the public authority, which ensured not only unity of size, but also of species for any one section of street.

Within the city structure various different kinds of landscape treatment have been employed from the formal layout of Parliament House grounds, to the quite informal Telopea Park.

CURRENT DEVELOPMENT AND POSSIBLE FUTURE TRENDS.

Progress with the development of the city has brought forward some projects which could not be commenced in the earlier years, but above all, some aspects of design have been modified to meet the needs of the mechanical age in which we find ourselves, which makes it essential to carry out all establishment and maintenance work as far as possible with machines. Design which does not allow for this can, of course, not survive. In general, it means a modification rather than a change.

In this connection, policy with regard to open space is affected, in which it is necessary, while maintaining about the same proportion of open space to built-up area, to have fewer and larger open areas in comparison with more numerous smaller ones.

In addition, the function of open spaces is thrown into relief by the Canberra climate, and while some is provided for active and passive recreation and developed accordingly, other areas must simply be regarded as places to contain trees to provide a suitable framework to give desired shelter and aesthetic effects and places into which people can go without any pattern of behaviour determined by structures and facilities which are provided in the more conventional parks. This feature of town living has become quite apparent in Canberra, and is a very desirable provision in the city design.

It has also been possible to proceed with main avenue development. These avenues form the basic frame work in the city design. It has been decided to plant them with mainly evergreen trees which will give a permanent, all the year around, structure in the appearance of the city from the ground. Many of the evergreens will be native Eucalyptus trees, which it is fitting should be used in the National Capital, and are also appropriate because they will reach a large size and therefore produce a proper proportion in the main avenues, and yet will not interfere with winter sun which in a rather cold area like Canberra is an important feature in residential areas, and leads to the wider use of deciduous trees in the residential streets.

The treatment of open spaces has also been modified by the introduction of informal mass plantings of trees, producing a pattern of rather bold design using broad masses, but at the same time preserving a balance between unplanted and planted areas within the open space. This policy results in an immediate occupation of the ground by the trees, which are then maintained by thinning and pruning, but at the same time providing at an early date an area which can be used, and one in which the maintenance is very much reduced because long tussocky grass will be eliminated. This links with one of the needs to replace the green sward of northern countries with alternative methods of treatment in those cases where turf is not necessary for a direct function. The close planting of trees is the principal method by which this can be done in Canberra. In some places satisfactory results can be achieved simply by meadow mowing the native grasses and green is not the only colour of value in the landscape.

The growth of population also throws into relief the need for further amendments to the policy of management affecting the lands immediately around the city which, while they have been developed in part, (as for example extended Paine planting

on Green Hills, and the setting aside of a flora preserve adjoining the Botanic Garden on Black Mountain), there is a need for further extension, because although the trees that were retained in pursuance of the policy mentioned earlier, were satisfactory 30 years ago, they are now beginning to suffer severely each year, and losses are becoming progressively greater. At the same time, the needs of the growing population make it important that there should be a buffer zone or "green belt" reservation around the city which is managed to meet the needs of the population and in which the tree and soil capital is being built up, instead of remaining static. Such a modification is a consequence of the passage of time and was not necessary in the early stages of development.

Modification of treatment of residential areas is also possible, both to produce some variety in the city treatment, and to meet still more adequately, modern needs of living and of maintenance. For example, the very effective treatment common in many American cities of an informal street tree planting both inside and outside the property line, and the elimination of hedges, might very well be employed in parts of Canberra.

There are two technical aspects in which substantial progress can also be made—firstly, an increased use of native vegetation; and, secondly, the improvement of all plant material, native and exotic, for city use by breeding and selection.

In the first case, continued collection and trial are likely to yield many species suitable for municipal and domestic garden use which have been overlooked simply because our tradition is European and our gardening practice stems mainly from an English origin. It is not simply a matter of prejudice, because the plants which can be used and which were employed in the traditional garden, are those which have been selected and tried over long periods and found to be successful, and it is only now that we are emerging from this more limited field to employ those native plants which can be effectively incorporated.

The improvement of plant material by selection and breeding, bears on important points such as the suckering habit of some trees. Some of our very best trees have had to be discarded as street trees because of the root suckering habit. While it is too early to be certain, there is a very good chance that breeding may result in the production of non-suckering trees, and work is in progress with Silver Poplars to this end. Likewise, Canberra lacks the brilliant Red Flowering Eucalypts which is so much admired in coastal cities, and again there is a prospect by breeding methods, of developing a tree which will be sufficiently frost-resistant to withstand the Canberra climate, and yet possess the brilliant red flowers of some of the desirable species.

Further prospect is the improvement in resistance of trees such as some species of Eucalypts to leaf-eating insects which may result in very costly maintenance, and perhaps cause their elimination from general use. Examples of this kind could be multiplied, but they emphasise the need for progressive work of this kind if plant material suitable for use in our towns and cities is to be developed to keep pace with the changing needs of our cities as emphasis in our social organisation changes.

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