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Planning Your Garden to Conserve Water





FRONT COVER

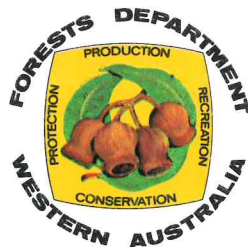
Native garden planted on road verge in cul-de-sac. Note effective ground cover adjacent to drive.

▲ Lawn verge used to highlight native garden. (The garden has been planted for three years, watered weekly for the first summer, and monthly in subsequent summers.)

▼ Native plants fronted by narrow lawn edging. This grass could be replaced with ground cover for easier maintenance and water conservation.



Planning Your Garden to *Conserve Water*



By R. J. EDMISTON for
B. J. BEGGS
Conservator of Forests


Reprinted 1981



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◀ Native garden with ground cover contrasting with moisture-demanding grassed area. Both areas are watered simultaneously, although the native plants need only a fraction of the lawn requirements.



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Introduction

The rapid growth in population, housing and industry in Perth is placing an increasing demand on our limited water storage areas. In 1972 the demand for water in the Perth area was 155 million cubic metres and this is expected to increase to 420 million cubic metres by the year 2000.

Demand for water in the past has been met by damming rivers within the Darling Plateau and supplemented by pumping water from underground aquifers on the coastal plain. By 2000, if Perth's population and expansion in industry continues to grow at its present rate, these supplies will not be sufficient to meet the demand and new sources will be required. These new sources will have to come from the damming of rivers further south (north, if the Ord dam is considered) or by the establishment of desalination plants.

All of these avenues will increase water rates enormously and the average person will be forced to be more conservative in their use of this scarce commodity.

This critical water situation is further accentuated when droughts occur, like the one we experienced in 1976, and could result in the need for heavy water restrictions. The metropolitan water authorities estimate that 70 per cent of the water consumed in Perth is used on gardens and it is in this region that drastic restrictions would apply.

How can we keep our city the "garden showplace" it is now without using the vast quantity of water that the present predominating exotic plants require?

The answer is obvious and encounters us whenever we venture past the city development limits. It is the wise use of native plants in our gardens.

Advantages of native plants

- There is a wide range of plants available for whatever soil type you have in your garden.
- No soil preparation is necessary except where plants are being introduced from a totally different soil type.
- Watering is reduced to a minimum.
- Holidays become more enjoyable as watering need only be applied to whatever lawn area is planted, and this is not too much to ask of the next-door neighbour.
- Fertiliser requirements of native plants are low.
- When replacing plants, root competition from established natives is not a problem.

Disadvantages of native plants

- The large glossy foliage common with a range of exotics is not available.

Garden design

In planning a native garden the exotic plants, which may attract you, need not be excluded completely, but should be grouped according to their water requirements.

1. Exotics requiring frequent watering such as azaleas, camellias, etc., should be planted together.
2. The soil preparation should include an abundant supply of humus or peat, which acts as a sponge in the soil and will conserve moisture.
3. The site selected should be in a partially shaded area to conserve moisture through reduced transpiration.
4. Mulching the soil surface will reduce evaporation.
5. Exotics not so demanding of water, such as the general range of shrubs, can be grouped again using ample humus or peat worked deep into the soil and a mulch added to reduce evaporation.
6. The exotic garden should be compact and *not extensive*, and should be sited in such a manner that the transition from exotic to native plants is broken by a suitable barrier such as lawn, ground cover, bark, chip, pathway or slabbed area.

In advocating the use of native plants it is not intended to imply that already existing exotic gardens should be suddenly switched to natives. In this situation when a change is desired or replacement necessary, the area should be designed in a way that watering can be controlled to the requirements of the new plants.

Reduce lawn area

At least 90 per cent of the water used on gardens is applied to lawns. A nice green lawn does much to enhance the appearance of a home, provides an area of relaxation for summer entertainment and a play area for the children—but do we require the extensive areas that now exist around most homes?

The road verge is council land and in some suburbs is separated from the private property boundary by a footpath; in other areas footpaths do not exist or are on one side of the road only. Where a footpath divides the road verge from

private property, planting can be varied. Where a footpath does not exist the usual practice is to continue the lawn to the street verge. This large area of lawn is not essential and demands water. It can be landscaped, using natives to reduce the area of lawn, and so reduce water consumption.

On street verges shrub vegetation in excess of one metre in height can produce a hazard to motorists and dense natural bush verges should only be planted in culs-de-sac. Roadside verges can be made attractive with the use of ground covers, low shrubs and small flowering eucalypts. An alternative situation would be to maintain lawn on the road verge as a foreground to a native landscaped front garden, in which walkways, retaining walls and other landscape elements can be used to contain and highlight the native plants. Another method is to maintain a small area of grass as a central feature to surrounding rock-walled native gardens. These small areas of lawn are compact, reduce reticulation costs and water consumption.

Back lawns

Back lawns are the main areas of recreation for most families. However, in most cases the main use is restricted to the area closest to the house. This section is normally sufficient room for the young ones to play cricket or kick a football. As the children grow, more space is required and even a fully grassed backyard does not provide sufficient area to protect windows and plants. At this stage their football and cricket activities are usually transferred to the small recreation areas that the various shires have interspersed throughout the suburbs, and within walking distance of most homes. Certainly an interim period exists between the two stages, but this short period hardly warrants a fully grassed backyard.

Ground covers versus lawn

Ground covers are regarded as the alternative to lawn. They replace a lawn only from the visual outlook and will not stand the recreational activities that a lawn will. Their use is therefore confined to areas where a lawn is required to complement the landscaping and will not receive a lot of traffic. Ground covers are ideal water conserving substitutes in these situations, and crazy pathing or stepping blocks can be placed

among the ground cover to facilitate access to other parts of the garden.

Ground covers are listed in most catalogues as spreading plants and in some cases the fact that some species also produce upright shoots is not mentioned. These shoots can be removed as they grow but it is more practical to plant the most suitable ground cover species.

Types of ground covers

Ground covers can be divided into three groups:

1. Low spreading shrubs.
2. Flat ground covers with one rootstock
3. Flat ground covers that perpetuate themselves by rooting from the internodes.

The first and second groups are used to best advantage as a front feature to a background of higher shrubs, interspersed between shrubs or trees, or to cascade over rocks and embankments.

The third group can also be used in this manner but are the only ones that should be grown in place of lawn. It is therefore important to find out from your nurseryman if rooting from the internodes is a feature of the plant, prior to using it as a substitute for grass.

Selecting native plants

To select native plants for your garden so that soil preparation and watering is minimal, it is best to grade your plants according to the situations in which they occur in their native habitat.

For example, if you reside in Perth, have a block of yellow sand, and wish to design a garden without soil preparation and one that you can leave for a month at a time without watering, then the selection of plants should be drawn from:

1. Areas of yellow sand around Perth;
2. The poorer beach sand area of the Quindalup dunes, or
3. The yellow sand areas in the lower rainfall region north of Perth.

Plants from the loamier soils of the hills area or those from sand areas which experience higher rainfall should be excluded. Although some plants from the latter two areas are adaptable to the sandier soils or lower rainfall of the metropolitan area, it may be necessary with other species to improve the soil fertility or supply

them with additional moisture. This then disorganises the design. Plants with similar requirements should be grouped together.

If you are establishing a garden in the beach sands of the Quindalup dunes, then your selection will be confined to plants from this area alone. Apart from the dry hungry nature of the soil, sandblast and salt are two other environmental factors that have to be considered. In protected areas or swales and with the addition of yellow sand the range can be extended to include plants from the Spearwood dune system.

This same procedure can be adopted for areas with heavy loam, gravel or clay soils.

How to find the natural habitat of plants

Selecting plants according to their native habitat is all right providing the person has a knowledge of native plants, but how does the novice find this information?

Gardening books are plentiful in all bookshops but most are of European or eastern states origin and not applicable to our state. Western Australian publications on native plants are few, but those that do exist give a comprehensive coverage of our flora.

Publications

West Australian Native Plants in Cultivation, by A. R. Fairall.

This book covers a wide range of native plants that have been cultivated in King's Park. It gives a description of the plant, its height and spread, flowering time, and a description of its native habitat, as well as a lot of other worthwhile information.

Unfortunately, this valuable publication is out of print, and the likelihood of a reprint is doubtful due to its high cost and limited market. However, it is available on loan from nearly all public libraries.

West Australian Plants, by J. S. Beard.

This book lists all plants that grow in Western Australia except for new nomenclature. In an abbreviated form it gives the height, flower colour, soil type and flowering months. Its most important asset from the home gardeners viewpoint is the division of the species into botanical provinces, together with an accompanying map.

Flowers and Plants of Western Australia, by Rica Erickson, A. S. George, N. G. Marchant, M. K. Morcombe.

This publication divides the state into different zones and contains 538 colour plates of a limited range of vegetation from these areas. It discusses soil type and plant height.

Wildflowers of Western Australia, by C. A. Gardner.

In this book the plants are divided into families and a description of the plants and their habitat is given. This is a worthwhile publication but has a limited coverage.

Eucalypts of the Western Australian Goldfields, by G. M. Chippendale.

This book covers most of our ornamental mallee eucalypts in a comprehensive manner. Photographs, both coloured of the blossom, and black and white of tree form, together with distribution map, soil type, temperature range, etc., make it a worthwhile publication.

A Field Guide to Banksias, by Ivan Holliday, Geoffrey Watton.

Similar to above but covering banksias of Australia.

West Australian Plants for Horticulture—Parts 1 and 2, by Ken Newby.

Two informative publications covering the plants natural habitat, full description and cultural information.

Australian Plants

A quarterly periodical, 48 pages. Available from the Editor, The Society for Growing Australian Plants, 860 Henry Lawson Drive, Picnic Point, N.S.W. 2213.

Growing Native Plants

A series of informative volumes from the Canberra Botanic Gardens. Available from the Australian Government Publishing Service, Newman House, Perth.

Selected Flowering Eucalypts of Western Australia

A low-priced Forests Department production, including photographs and information on 29 species and five varieties of decorative eucalyptus trees. It includes comments and a table on soil

types and rainfall in area of natural distribution. Available from Forests Department (or post free for \$1) and Australian Government Publishing Service, 200 St. George's Terrace, Perth.

A Guide to Native Plants for Western Australian Gardens

A descriptive booklet published by the Wanneroo Nursery and available through most newsagents.

How to establish native plants

In their natural habitat native plants are regenerated from seed. After sprouting the plants put on minimal growth in the first 12 months, but develop a long tap root system which is out of proportion to the above ground section of the plant. This is nature's way of reducing loss from transpiration until a substantial root system is formed. The root system will then support subsequent vegetative growth above the ground, as its roots penetrate well into the moister zones below. As this deeper zone of moisture dries out toward the end of summer the xerophytic characteristic that our native plants possess takes over, the stomata close and transpiration practically ceases. The plants are then at their most dormant stage.

To use native vegetation to its fullest extent as a means of conserving water it is necessary to replicate nature as far as it is possible.

Planting from seed is possible but results can be disappointing. The happy medium, therefore, is to plant out already established plants. These plants should not be large but sturdy, healthy and hardened specimens in a four- or five-inch pot size and no larger than a six-inch pot. Planting should be carried out once the winter rains have started and the ground is sufficiently moist. This is usually the middle of June in Perth.

Water requirements

If native plants in the small pot sizes are planted at this time further watering is unnecessary. The plants will establish themselves with the winter rains and as the rains taper off, and the soil dries out, the roots will follow the moisture down and an equilibrium will be established. If larger plants are used, or if planting is carried out at other times during the year, watering will be necessary until the following winter when the plants can be left to adjust themselves.

With this system of establishment, water requirements are negligible but the growing stage is regulated to the length of time that moisture is available. To increase the rate of growth supplementary watering can be given, but good growth can be achieved on 9 litres a plant per week during heat wave conditions or 4.5 litres a week during cooler periods. After the first year of growth watering can be reduced to monthly application to keep the plants healthy and green.

Mulching

Mulching is an ideal method to reduce the evaporation of soil moisture and can take the form of bark chips, gravel or any other material that is comprised of large aggregates which will break the capillary action of the surface soil. The medium used should not be toxic to plant growth. Plastic sheeting is another material that can be used as its impermeability prevents evaporation.

If the garden is prepared with the idea of eliminating water entirely after the plants are established, then mulching must be done with caution. Mulching plants which are to be left to fend for themselves can retain moisture in the surface layer and the roots are not encouraged to follow a gradually declining moisture table. When this top region does dry out during the summer months, the plants' roots may still be on the surface and will be affected by drought. With this type of establishment it is preferable to forego mulching until the second year when the roots have penetrated deeply. If mulching is required for aesthetic appearances then it can be scattered thinly over the surface, in which case its effect on the drying out pattern will be minimal.

Where weekly or monthly waterings are being used, mulching is definitely advantageous both aesthetically and for water conservation.

Weed control

Where native plants are to be grown with minimal or no water, it is important to control all weed growth as weeds compete, to the detriment of the plants, for moisture.

Fertilising

Contrary to popular belief, native plants respond favourably to fertiliser applications. Practically any fertiliser can be used providing the concentration of the particular brand is known and it is applied accordingly.

The humus and clay content of soils work as a buffering agent to fertiliser applications. These ingredients have the ability to attract a proportion of the elements applied and these are released to the plants over a period of time. In sand, which is mostly devoid of humus and clay particles, the plant receives the fertiliser application in its concentrated form, and consequently damage will often occur in sandy soils where the same application would not affect similar plants in a heavier soil.

Fertiliser should always be applied in small amounts and the concentration of the components of the particular brand known before it is applied. All general artificial fertilisers contain the basic elements: nitrogen, phosphorus and potash, and these are printed on the containers on all brands as N.P.K. and a percentage figure given. The most damaging element is nitrogen, and in lawn fertilisers this element occurs in a highly concentrated, readily available form. These fertilisers should therefore be avoided for native plants. If they are used as a booster to a native garden, the application should be very light and away from the base and foliage of the plants.

The best fertilisers to use are the slow release fertilisers which are available in a pelleted or pill form, or else a fertiliser that contains most of its nitrogen in an organic form.

The slow release fertilisers do not dissolve in the soil immediately but have a reservoir of prolonged release nutrients activated by soil bacteria.

Potato Manure E does not contain a high concentration of nitrogen and when mixed 50/50 with blood and bone it provides a balanced, safe fertiliser for natives. It should be applied at the rate of one handful to the square metre.

Pruning

All native plants benefit from pruning at some stage in their life and this can be carried out at any time providing cutting is not excessive. As for exotics, pruning should be performed after flowering, but light pruning to control shape and attain the desired effect is possible throughout

the year. If a plant reaches a stage where heavy pruning is necessary it should be carried out in the cool autumn months which is the most dormant period.

Replacements

At various stages in the life of a garden, plants may become unthrifty or die, or the appeal of a particular plant may wane. In these circumstances replacements are desirable and it is here that natives present little trouble.

Native plants do not have the strong fibrous root systems of exotics and replanting can be done without fear of an established root system from other plants competing for moisture and nutrients. All that is required in the area being replanted is the replacement of the soil with fresh soil from another area.

The following list of plants are species suitable for garden culture. The list is not a comprehensive classification of all Western Australian plants, but presents a range of desirable species for different soil types in the metropolitan area. The plants marked with an asterisk may not be available from nurseries at present, but seed can be procured in some cases and as techniques are perfected and cultural problems are overcome the range available from nurseries will be extended.

With the increase in the cultivation of native plants, hybrids and sports will occur. This has already started and is pronounced in the *Grevillea* genus. It is difficult to assess the requirements of these plants without knowing their parentage, and the specific names given to these hybrids makes this impossible to ascertain. These plants still warrant a position in the garden and their requirements will have to be judged on a trial and error basis, unless nurseries furnish more details of parentage in their catalogues.

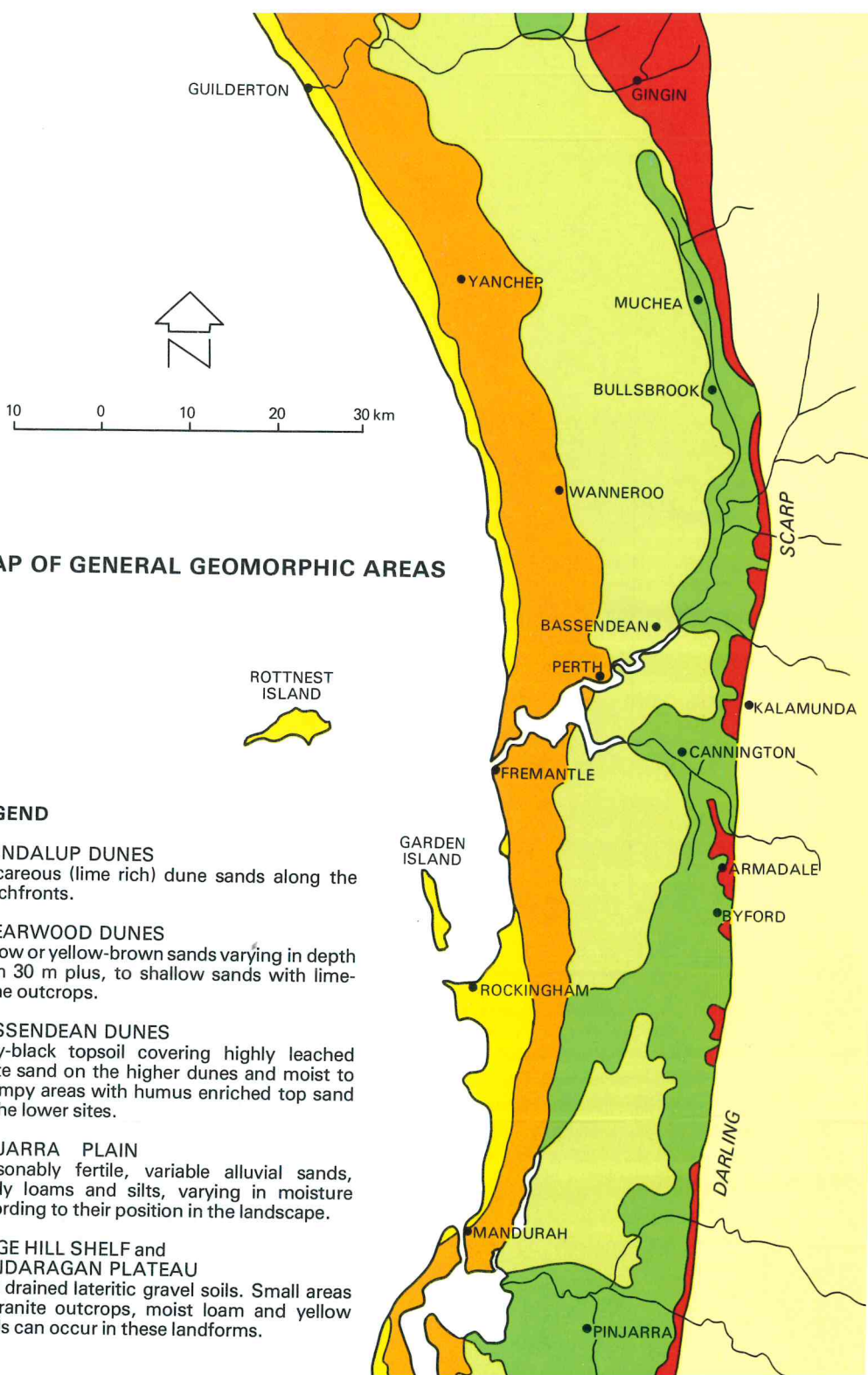
Native plants from the eastern states are frequently catalogued and some of these make a welcome addition, particularly when they are adaptable to harsh sites as is the ground cover *Kunzea pomifera* from South Australia, which extends our limited range of plants suitable for the coastal dunes.

DESCRIPTION							GENERA AND SPECIES	NATURAL SOIL HABITAT											
Trees	Shrubs	Ground cover rooting at internodes	Ground cover not rooting at internodes	Low shrub and ground cover	Perennial herbs	Climbers		Sandy loam fringing granite outcrops	Yellow sand with limestone outcrops	Yellow or red sands	Beach sand	Leached sand, dry	Leached sand, moist	Sandy peat	Gravel, dry	Gravel, moist	Loams, dry	Loams, moist	Sand over clay
	L M M M S S M S M						Acacia cyclops drummondii glaucoptera graffiana lasiocarpa myrtifolia *nervosa rossei				X								X
	S S						Adenanthos *barbigera *obovatus						X						
M	L M						Agonis flexuosa juniperina linearifolia			X									X X
					S L S M S M M S		Anigozanthos *bicolor flavidus *humilis manglesii *preissii pulcherrimus rufus viridus			X X			X X		X			X X	
	M						Astartea *fascicularis							X				X	
	S						Astroloma *microdonta	X							X				

	M						Atriplex isatidea				X								
	S						Baeckea camphorosmae	X							X			X	
S M	L S L L L L L L L L L						Banksia ashbyi attenuata audax baueri brownii burdettii coccinea grandis hookerana media menziesii prionotes sceptrum speciosa			X X X X X X X X X X X X	X							X X X X X X X X	
S S S S S S S	M M M M M M M L L						Beaufortia *decussata *elegans orbifolia sparsa squarrosa						X	X X X	X				
						X	Billardiera *candida erubescens bicolor ringens								X			X	X
	S S S S S S S						Boronia cymosa *fastigiata heterophylla megastigma purdieana spathulata viminea					X		X X X	X X			X X X X	
S							Brachychiton gregori								X		X		

TREES. S = Small trees up to 6 m in height. M = Medium trees up to 10 m in height. SHRUBS. S = Small plants to 1 m. M = Medium plants to 2 m. L = Large plants beyond 2 m.





MAP OF GENERAL GEOMORPHIC AREAS

LEGEND

- QUINDALUP DUNES**
 Calcareous (lime rich) dune sands along the beachfronts.
- SPEARWOOD DUNES**
 Yellow or yellow-brown sands varying in depth from 30 m plus, to shallow sands with limestone outcrops.
- BASSENDEAN DUNES**
 Grey-black topsoil covering highly leached white sand on the higher dunes and moist to swampy areas with humus enriched top sand on the lower sites.
- PINJARRA PLAIN**
 Reasonably fertile, variable alluvial sands, sandy loams and silts, varying in moisture according to their position in the landscape.
- RIDGE HILL SHELF and DANDARAGAN PLATEAU**
 Well drained lateritic gravel soils. Small areas of granite outcrops, moist loam and yellow sands can occur in these landforms.

