Sustainable Landscapes

looking after the future

Gardens and parks are a remarkably important part of our urban landscape. They provide a host of benefits, including a critical role in alleviating the effects of a warming, drying climate. Our landscapes, prior to urban development, were alive with diverse communities of flora and fauna. Healthy gardens and parks restore some of the benefits and ecosystem services that the natural landscape once provided.

Shade: Plants lower air temperature and provide essential shade and natural evaporative cooling to the soil and air, other plants, animals, water, roadways and buildings. Buildings shaded by trees have less need for air conditioning and, therefore, for energy consumption. Roads and footpaths shaded by trees have considerably longer useful lives.*

Water: Creeks and rivers are naturally cleansed and filtered by the plants that live in and around them. Trees and shrubs, sedges and grasses, herbs and groundcovers are all part of the natural system that attracts rain, absorbs and filters water and returns it to the landscape clean and healthy.

Oxygen: Plants process carbon dioxide and release oxygen, providing a major service to the quality and freshness of the air we breathe. As CO^2 levels in the air increase with human development, plants have a primary role in absorbing this greenhouse gas and producing oxygen necessary for the survival of all living things.

Habitat: Vegetation provides critical habitat for fauna such as the insects, birds and bats that pollinate flowers so plants can reproduce and for soil fauna and micro-organisms that recycle dead matter and condition the soil. Plants and animals depend upon each other for survival and we, as part of the natural system, depend upon both.

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Conserving water in the garden

If gardeners will forget a little the phrase, "watering the plants" and think of watering as a matter of "watering the earth" under the plants, keeping up its moisture content and gauging its need, the garden will get on very well.

Henry Beston, Herbs and the Earth, 1935

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Food: Food produced locally saves the energy consumed and emissions produced in transport. Many nutritious and delicious foods can be grown in gardens without requiring excessive water. Growing food, whether in home or community gardens, also contributes health and social benefits.

Health: Working, walking and playing in parks and gardens all contribute to a healthy lifestyle and help connect us with nature. Whether through providing exercise or relaxation, gardens enrich the physical and mental wellbeing of urban communities.

Business: Creating and maintaining parks and gardens, whether as public or private spaces, provides employment and supports local enterprises such as design, nursery, garden and landscape industries.

Gardens provide a wealth of benefits for people and our landscape and it is essential to find ways of having wonderful gardens that do not require too much water.

** When planting trees and shrubs close to roads or buildings check for SA Water approved species; some tree roots can damage pipes, pavements or foundations*

Selecting the right plants

Instead of low water use plants, we should really focus on plants that suit the water available in the local environment, wherever that may be. In much of South Australia rainfall is relatively low, especially in summer. In most situations we need to select plants that, once established, will survive mainly on the natural rainfall. Even with some supplementary supplies available, in our environment water will always be a precious resource.

Choosing plants that enjoy our hot, dry climate

Plants that can tolerate dry climates, including times of drought, have certain characteristics. They tend to respond differently to water shortage and are able to extract more water from the soil than drought sensitive plants.

Drought tolerant plants often have deep roots, can access more water than plants with shallow roots and they tend to look healthy even when there is little water available.

The structures and surfaces of their leaves are designed to reduce water loss; leaves are often small, thick, waxy, hairy, needle-like or succulent. Leaf colours are often pale such as grey-green, grey-blue or silvery to reflect heat and light and minimise water loss.

Mediterranean climate plants from places such as Chile, South Africa, California, the Mediterranean Basin and south-west Australia have evolved to endure long periods without rain and these are often well-suited to South Australian gardens.

In good deep soil, infrequent but deep watering no more than once each month should be sufficient to keep them healthy.

Desert plants such as cacti and succulents often have shallow root systems rather than deep roots in order to benefit from the occasional rains and light showers, fogs and dews of desert environments. Cacti and succulents are useful as container plants as they can survive without frequent summer water.

Design

Good design can also help conserve water.

- Place plants to suit local conditions within the garden landscape; make the best use of naturally dry and damp areas, sunny and shady areas.
- Design so that plants protect each other and create a microclimate where each receives the most appropriate amount of sunlight and shade.
- Group plants with similar water needs together. If drought tolerant plants receive too much water they can suffer root rot as well as excessive growth which may reduce longevity.

For low water use and non-invasive plants suitable for South Australian environments:

www.environment.sa.gov.au/plantselector

Using natural rainfall

Average rainfall varies across South Australia from less than 200mm in northern arid regions to over 600mm in parts of the Adelaide Hills, Kangaroo Island and the South East. Selecting plants that suit the rainfall pattern of your location will give them the best chance to survive and thrive.

For plants to depend mainly on natural rainfall, they require conditions that maximise their ability to access and use available water. Ways to assist a garden make the best use of rain:

- Winter rains must be able to soak into the soil; avoid hard, non-permeable surfaces that direct rain away from plants.
- Direct any water that falls on pathways and driveways into the garden soil.
- Water needs to be able to penetrate deep into the soil; ensure soil is well prepared using appropriate organic material such as compost.
- Ensure the surface of the soil is not compacted by walking or driving on it.
- Create shallow wells around plants to help retain water.
- Minimise evaporation by mulching with coarse organic mulch; mulch with fine particles tends to prevent water from reaching the soil and can absorb water from the soil.
- Protect plants and soil from wind by using fences, screens, buildings or other plants.
- Protect shade-tolerant plants from too much sunlight.
- Collect and use as much roof water as possible.

Using mulch

Mulch helps to conserve soil moisture by reducing evaporation. To make the most effective use of mulch however, it is best to observe and use nature as your guide. Natural leaf litter mulch has many benefits that include protecting soil surface from erosion, keeping soil cool, controlling weeds and providing nutrients. Plants from different environments, however, have different needs.

- For plants from desert environments, use rocky or gravel-like materials as rich organic matter may harm the plants.
- For plants from low rainfall areas where mulch is naturally thin on the ground, use coarse organic mulch low in plant nutrients and up to 50mm thick. Nutrient rich mulch will result in over stimulation of roots leading to greater water uptake.
- For drought sensitive plants use a thicker layer of coarse organic mulch.
- Avoid fine mulch as it tends to absorb moisture and may not allow rain to reach the soil. Fine mulch can even absorb water from the soil itself.
- Do not use wetting agents in mulch as this encourages mulch to trap moisture.

Using fertiliser

Adding fertiliser to soil when first planting can help plants get started. Some experts suggest it is best not to fertilise drought tolerant plants once they are established, however, as adding fertiliser can affect their drought tolerance. These plants are usually adapted to grow in soils with minimal phosphorus and nitrogen, and supplements can stimulate increased growth and water use while reducing root growth.

Growing fruits and vegetables

For waterwise fruit and vegetable suggestions and tips see the Sustainable Landscapes information brochure: *Making community gardens more sustainable.*

Using recycled water

Greywater, the water from showers, baths and laundries, is being used increasingly for supplementary garden watering. Greywater can be a useful source of garden water providing health and safety considerations are taken into account:

- Use laundry detergents with low sodium and phosphorus levels; high concentrations damage soils and plants.
- Use liquid laundry detergents rather than powders.
- Do not use detergents containing boron (perborate); it can be toxic to plants.
- Do not use water containing disinfectant, hair dye or bleach.
- Permanent plumbed greywater systems must be approved by the Department of Health.

Saline water

- Be careful when adding saline water to garden soils as increased soil salinity can damage plants. Salt reduces the amount of water that plants can absorb from soil.
- When planting in saline soils or when adding saline water to the garden (such as some greywater), select salt-tolerant plants.
- Avoid using saline water that has passed through a water softener as the process removes calcium and magnesium and replaces with sodium.
- If you are using saline water on garden soil do not allow the soil to dry out between waterings.

Improving soils and using compost

As well as providing nutrients for plants, organic matter improves soil structure, allowing the soil to hold more water. The simplest ways to improve organic matter in soil are to allow leaf litter to break down naturally and to add compost. If purchasing compost ensure that it conforms to the Australian Standards for Composts, Soil Conditioners and Mulches as this guarantees the absence of weed seeds, pathogens and other harmful substances. When making your own compost do not include diseased plants or viable seeds.

Other ways to improve and look after soil:

- Allow wet soil to drain before you dig into it.
- Where soil has been modified during construction works, mix the layers together.
- Terrace steep slopes or plant them with groundcovers to reduce water run-off.
- To improve non-wetting soils add clay and mix well; to improve clay soils add gypsum and mix well.

Water efficient lawns and alternatives

While lawns are useful for recreational activities, minimise lawn area to where it will be used.

- Select warm-season lawn grass that is tough, water efficient and non-invasive.
- Be careful with Kikuyu and Couch as they can be highly invasive. Do not use invasive grasses in areas where they can invade garden beds or natural landscapes such as watercourses.
- Use sub-surface drip irrigation suitable for burying in soil.
- Use tank water or greywater where possible.
- Once established water infrequently and deeply (aim for no more than once a month) to encourage deep root penetration.
- Allow lawn grass to grow long to help shade roots and reduce evaporation.
- When mowing, cut grass to stay tall; this encourages deeper root growth.
- Allow grass to brown off a little in summer.

Alternatives to lawn grass include drought tolerant groundcovers, shrubs and grasses or mulch; these all provide permeable surfaces that will allow water to penetrate the land. Some groundcover plants appear similar to lawn but require little water once established and no mowing. Selected native grasses can be used to create lawns although these may not be so hard wearing.

Artificial grass: While for some applications this may be a good, functional alternative, Sustainable Landscapes does not generally recommend this product as it is a petrochemical product, can prevent good rainfall from soaking into the soil, can leach toxic substances into soil, provides no habitat benefit and does not contribute to evaporative cooling. Seek advice from professionals at your local nursery or turf supplier.

More tips for using supplementary water effectively

- Young plants (tubestock) usually establish more quickly than advanced plants.
- Allow established plants to become water stressed between irrigations; this will help minimise supplementary water use, prevent excessive growth and can reduce disease.
- In dry periods, infrequent, deep waterings no more than once a month should be sufficient.
- If plants do suffer from lack of water, trim branches or foliage to reduce their water needs temporarily.
- Use devices such as tap timers in conjunction with soil moisture and/or rain sensors; use of tap timers can result in unnecessary watering if not monitored.
- Use appropriate under-mulch drip irrigation to minimise water loss through evaporation or run-off.
- Place drip lines underneath mulch layer but not underneath soil (except in the case of lawn).

References and useful resources

There are many books and resources available about water efficient gardening: these are just a few.

Good gardens with less water
by Kevin Handreck, CSIRO Publishing 2008

Sustainable Landscapes Plant Selector:
www.environment.sa.gov.au/plantselector

Sustainable Landscapes Project:
www.environment.sa.gov.au/sustainablelandscapes

SA Water: www.sawater.com.au

Australian Plants Society: www.australianplantssa.asn.au

State Flora: www.stateflora.com.au

Sustainable Gardening Australia: www.sgaonline.org.au

Test results on laundry products: www.lanfaxlabs.com.au

Climate data for South Australia: www.bom.gov.au/weather/sa/ and www.bom.gov.au/cgi-bin/climate/cgi_bin_scripts/annual_rnfall.cgi

Brochure prepared by Sheryn Pitman.

Planting tip

The best time to plant is autumn. The soil is still warm and the opening rains have just begun or are about to begin. New plants have time to grow into their new homes before the next hot dry summer. If you miss late autumn, try early winter.

Until they are established all plants require some 'tlc' which includes water, so planting just before or after the opening rains gives them the very best chance!

Always check and adhere to water restrictions by visiting www.sawater.com.au or calling the Water Restriction Hotline on 1800 130 952.

The Sustainable Landscapes project is a collaborative partnership between the Botanic Gardens of Adelaide (Department of Environment and Natural Resources), Land Management Corporation, Adelaide and Mount Lofty Ranges Natural Resource Management Board and SA Water.

The project demonstrates and promotes appropriate park and garden design, plant and material selections and sustainable horticultural practices for South Australian environments including effective, efficient and appropriate water use.

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www.environment.sa.gov.au/sustainablelandscapes

Landscapes Alive Plant Selector:
www.environment.sa.gov.au/plantselector

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Department of Environment and Natural Resources

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SA Water