Landscaping and garden design can simultaneously address aesthetics and amenity, water management, air quality, climate modification, biodiversity, habitat creation and local food production — and it can help warm and cool your house! The planning and design of outdoor space should be considered an integral part of your home’s sustainable design.

Sustainable landscaping is an approach to designing and constructing the artificial landscapes that surround our buildings and improving the natural landscapes which already exist. Ideally these landscapes should maintain themselves and survive by being part of the natural cycles of the local environment. Sustainable landscaping means putting back much of what may have been in place before development. It enhances biodiversity. It may also mean introducing things that were not there before, to ensure that the landscape can be socially, economically and environmentally sustainable in future.

The site

Sustainable landscaping is about more than planting Australian native vegetation, it is about designing landscapes to fit the new ecology created when buildings are constructed. It can include food-producing gardens irrigated by captured stormwater and landscaping practices like permaculture, which takes an approach to landscaping and design that uses ecological principles to create sustainable environments with an emphasis on food production and resource conservation.

Sustainable landscaping includes such diverse approaches as restoring creeks where development has changed or annihilated their previous course, or creating roof gardens to replace the productive capacity of the land taken up by a new building.

Sustainable landscaping may be used to control the amount of salt in the soil (salinity), help increase the processing of carbon dioxide through photosynthesis and absorption of carbon, and contribute to restoring and maintaining biodiversity. The location of vegetation can influence choices about building orientation: a tree may shade part of a site and limit solar access but be an essential part of retaining soil, providing habitat and creating shelter.

Take account of existing vegetation for windbreaks, shading and views, and use trees and vegetation to form part of the view.

When choosing a site, take account of existing vegetation for windbreaks, shading and views, and remember that trees and vegetation can be seen to form part of the view, not just block other views.
Design landscaping to be experienced from both inside and outside the home. Sustainable landscaping can be employed to create shade, or to enhance or frame views. It can be attractive to look at and also provide privacy from surrounding buildings. It can supply food and help create pleasant areas for recreation. (see Choosing a site)

In recent years the definition of a sustainable landscape has evolved to include landscape elements that are literally part of a building. Many extensive green roofs are constructed specifically to support native and indigenous vegetation as part of a wider strategy for enhancing or replacing the natural biodiversity of a place or region. Often this kind of roof greening strategy is also geared towards providing habitat for threatened or endangered species. Depending on their context, function, vegetation types and watering regimes, green walls can also be legitimate contributions to the creation of a sustainable landscape and may even be integrated into wastewater treatment systems. (see Green roofs and walls)

Growing plants

Sustainable landscapes use plants that perform well in the local area. Suitable plants may include native and indigenous plants, as well as exotics (non-Australian plants) from similar climatic zones. Plants should ideally perform well once established on existing soils and with existing rainfall patterns without the need for excessive watering, soil modification and intensive maintenance regimes.

What is the difference between ‘native’ and ‘indigenous’? In general terms, native plants are all plants from Australia; indigenous plants are those specific to a particular place. Avoid plants that are considered invasive or unwanted species in your region. Nurseries still sell them, so check with a reliable source, such as your regional natural resource or catchment board.

A sustainable garden uses a wide range of plants from different structural categories, such as trees, screening shrubs, medium shrubs, low shrubs, groundcovers, strappy plants and grasses, climbers, perennials and bulbs. This kind of ‘structural’ diversity encourages wildlife into the landscape and prickly plants form an excellent barrier and provide shelter for small birds. Ensure wildlife is not compromised or threatened by domestic pets.

Native animals can be protected from cats by keeping the cats indoors or in purpose-built enclosures.

Source: Paul Downton
Streets need trees.
Lawns are common features in Australian landscapes but they generally require high levels of water, fertilisers and energy to maintain their appearance. These impacts can be minimised by:

▪ removing lawn and replacing it with a mix of groundcovers and non-woody plants and permeable surfaces such as gravel
▪ reducing the extent of lawn and increasing the area of hardy garden beds
▪ substituting exotic grass species with drought-tolerant low-maintenance native grasses that retain the appearance of a conventional lawn.

Synthetic grass products are an inappropriate choice for sustainable landscapes. Non-living, synthetic plant substitutes diminish, rather than add to biodiversity. They are products of mining and a great deal of water and energy are used in their manufacture.

Food production

The traditional Australian quarter-acre block was regarded as a place to grow food for the family. Even a small block can support some food production. Growing fruit and vegetables is a way of reducing our ecological footprint, since the produce does not travel as far between point of origin and point of consumption and there are fewer opportunities for spoilage.

Most vegetables and fruits require fertile soils with good drainage, regular watering and moderate amounts of sunlight depending upon the climate. Vegetable gardens can usually be made in raised garden beds with the addition of home-made compost and well-rotted animal manures. Fruit and vegetables generally require regular drip irrigation.

Growing food in backyards and gardens almost always requires plants that are not native to Australia. Nevertheless, it may be an environmentally responsible choice because if food is grown locally and sustainably it reduces reliance on the use of water, energy and multiple forms of transport to obtain it from elsewhere.

Keeping bees or chickens in your backyard can provide benefits but there are a number of things to consider including checking with your local council for regulations and requirements. Roosters, for instance, are not needed to produce eggs and are generally not allowed to be kept on residential premises. See www.livinggreener.gov.au for more information.

Water

A house covers ground that was once productive natural landscape where rain soaked into the soil to support vegetation. Its roof can be used to capture rainwater that can then be used to irrigate new vegetation, perhaps even on a roof garden or balcony. Capturing water this way also reduces the release of stormwater to the street. (see Green roofs and walls; Rainwater; Stormwater)

Low water-use vegetation or ‘xeriscape’ can greatly reduce the need for supplementary garden watering. Indigenous species are usually the best for the low rainfall conditions found in much of Australia. (see Outdoor water use)

Vegetation can even take up effluent through subsurface irrigation, especially in outer urban and rural sites. (see Wastewater reuse)

The use of waterbodies like ponds and water features can be integrated into a sustainable landscape solution as part of an overall water management system and as part of the passive climate response strategy for your home.
Landscape materials

Landscape materials account for much of the embodied energy in a landscape project. Consider reusing existing site materials such as pavers and excavated rocks. Wherever possible, employ recycled materials such as crushed brick or concrete, recycled timber and products like recycled glass. If recycled timber is unavailable use sustainably managed plantation timber or timber composite products in preference to imported rainforest timbers. Avoid excessive amounts of paving which can contribute to microclimate heating and reduced site permeability. Follow the saying ‘pave only where you sit, stand and walk!’

Energy

Appropriate landscaping can enhance passive heating and cooling. Used as an integral part of passive design strategies, windbreaks can reduce wind chill or the impact of hot winds. Vegetation can cool and filter air as part of a passive cooling strategy. (see Design for climate; Shading; Passive cooling)

Shading needs to be seasonal and is best provided by deciduous plants. Australia has few deciduous native trees (Toona australis, red cedar, is one). Other ‘deciduous’ natives such as Brachychiton lose their leaves in summer and therefore cannot moderate solar penetration to suit passive design. It is best to assume that most native vegetation gives permanent or semi-permanent shade. (see Outdoor water use)

Captured rainwater or treated wastewater can be used to irrigate deciduous plants that contribute directly to a building’s passive solar performance.

Biological diversity and habitat restoration

If landscapes and gardens are designed to restore original vegetation, find out what the original local environment was like. This may be challenging, as in our cities and even in rural areas the landscape was significantly changed by European settlement.

Sustainable landscaping can assist in protecting and restoring biodiversity — which is the variety of all life, the different plants, animals and microorganisms, the genes they contain, and the ecosystems of which they form a part.

Residential development, especially in growth corridors, city fringes and holiday towns, often clears native vegetation. Even the most sensitive development can affect the integrity of natural ecosystems:

- Habitat is degraded when pest plants and animals are introduced — cats can decimate native bird populations.
- Buildings and roads alter drainage patterns and soil structure.
- Runoff and septic tanks alter nutrient levels and cause other long term problems.
- Bushfire requirements affect landscape design, such as maintaining minimum distances between houses and trees and having minimal vegetation in areas adjacent to houses.

Once land is cleared it is almost impossible to recover the full suite of indigenous species, remove introduced
Appendices
Landscaping and garden design

If you don’t have a large garden space or want to contribute to restoring the landscape as part of compensating for off-site impacts, consider participating in native landscape and ecosystem restoration projects run by not-for-profit organisations like Greening Australia, Trees For Life in SA and Men of the Trees in WA. Many tree planting and revegetation programs are also intended to compensate for carbon emissions. (see Carbon zero, carbon positive)

Minimise damage on-site
Building a house often has a substantial and deleterious impact on its site. By taking care of how the site is developed and using sustainable landscaping practices, the amount of damage can be greatly reduced:

▪ Retain as much native vegetation as possible as uncleared areas are a resource to be conserved.
▪ Avoid unnecessary disturbance to vegetation and soil, and limit clearing outside your building footprint.
▪ Retain significant habitat trees including dead trees with hollow limbs or trunks that provide shelter and breeding sites for animals.
▪ Consider your impact on waterways. Ensure that silt, lime, cement, paint and chemicals do not wash into drains or nearby watercourses (see Sediment control).

Select native and indigenous plants
A garden using native and indigenous plants requires much less watering and links your home to the ecosystem in which you live:

▪ Rehabilitate disturbed areas with saved topsoil and salvaged plants.
▪ Use native and indigenous species in the garden (see ‘Growing plants’ above). However, avoid environmental weeds which may spread into native vegetation and contribute to the decline of biodiversity.
▪ Maintain links between adjacent bush and your garden. Many animals, especially birds, invertebrates and small lizards, may be able to use your garden for habitat resources.

Design for birds
Bird life is an important part of every ecosystem and if you choose, it can easily be encouraged around your home:

▪ Create native bird habitats as part of your home’s landscaping by ‘birdscaping’ with indigenous plants around buildings to provide food and shelter.
▪ Design windows with tinted glass and screens so they are visible to birds.
▪ Consider using wall and roof gardens that grow indigenous plants.

Restoring biodiversity
Objectives for biodiversity conservation include:

▪ retaining native vegetation and increasing its quality and area wherever possible
▪ recovering threatened communities and species
▪ preventing rare species from becoming threatened
▪ repairing ecological processes.

Design for biodiversity benefit
Sustainable landscaping should try to incorporate biodiversity objectives into the design approach from the outset. You may find innovative ways to make a positive contribution:

▪ Design to minimise the use of water, land, non-recycled materials, toxic chemicals and energy.
▪ Identify flora and fauna, potential threats and ways of avoiding or minimising impacts as early as possible in the project. In situations where significant impacts are likely, a flora and fauna survey may be necessary and a nature conservation consultant may be helpful.
▪ Find out if aspects of Commonwealth and state legislation apply and if the planning scheme has policies that affect your site.
▪ There may also be biodiversity plans at the state, bioregional or catchment level. The planning department of your local council, or your regional natural resource or catchment board, should be able to advise you.

A new science of ‘biophilia’ (love of nature) is developing from the recognition that vegetation and natural environments have a measurable impact on our psychological health.

Species and restore ecological processes, but sustainable landscape design can go a long way towards restoring biodiversity.

Particularly challenging are sites where there is little ecological value or where pre-existing ecology has been destroyed. In such cases a substantial contribution to creating a sustainable landscape can be made by restoring as much as possible of the original ecosystem and increasing the ecological value of the site. (see Challenging sites)

Such strategies are particularly pertinent to urban sites where, very often, all indigenous vegetation has been removed for development. The movement to replace elements of original living landscapes now extends to the public realm. In choosing a site, consider the wider landscape and neighbourhood environment. (see Choosing a site)

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• Create ponds with edible fish and plants.
• Provide nesting boxes.

Waste rock from a building site and a local landscape supplier makes an attractive dry creek bed.

Design for bushfires
Sustainable landscaping can contribute directly to helping prevent and protect from bushfires:
• Avoid using highly combustible mulch.
• Use hard surfaces closer to the house.
• Avoid planting trees that will grow tall close to the house.
• Remove undergrowth where it could become a fire risk.
• Consider making fire-breaks, especially in the path of likely fire spread.

Climate change
Consider the predicted changes for your region and adapt your landscape accordingly. To cope with increased temperatures, shade the walls of your homes using trees, large shrubs and climbing plants. Where space is limited, use shade structures with climbers to reduce outdoor and building temperatures. Ensure the landscape has sufficient permeable surfaces to cope with increased rainfall events and return rainwater to the soil and subsoil layers. Capturing water in rainwater tanks and through greywater recycling will ensure water is available to sustain plants during drought periods. Organic vegetable gardens supply healthy food and reduce your household’s ecological footprint.

In dry regions consider creating a small mini-oasis which can provide passive cooling to the house. Locate this area on the cooler side of the building which receives evening breezes. Incorporate moisture loving plants, a water feature, permeable paving and water-harvesting methods in this space.

Maintenance
Sustainable landscapes have much smaller energy and water use impacts than traditional landscape designs but they still require management. Native gardens and the use of hardy plants can create environments that consume little water other than that provided by rainfall. Even then, there is no such thing as a maintenance-free landscape. Anything artificially created for human purposes requires ongoing maintenance, which should be factored into the overall picture of any home design.

References and additional reading
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www.environmentdesignguide.com.au
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LivingGreener — Composting, Keeping backyard chickens, Minimise food waste, Create a water smart garden
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Men of the Trees. www.menofthetrees.com.au
Sustainable Gardening Australia. www.sgaonline.org.au
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