Sustainable Landscapes

The great thing about sustainable landscapes is that they can simultaneously address aesthetics and amenity, water management, air quality, passive design, climate modification, biodiversity habitat creation and local food production.

There are literally hundreds of definitions for 'sustainable' but the basic idea is that if something is sustainable it can keep going indefinitely. Natural systems have been operating successfully for millions of years. Nothing made by humans can do that.

Sustainable landscapes are concerned with the planning and design of outdoor space. It is important to consider the landscape as an integral part of your home's sustainable designs.

The scope of design of outdoor space may range from revegetation of a large bush block to the detailed design of small courtyard spaces intimately linked to a sustainable home. The extent and type of vegetation is obviously important but sustainable landscape design can do many things including providing practical solutions to reducing water use through water sensitive design and as part of a wastewater treatment system.

This garden has been planted with local wetland plants and attracts frogs, dragon flies and local birds.

Sustainable landscape design is an approach to designing and constructing the artificial landscapes that surround our buildings. Ideally these landscapes should maintain themselves and survive by being part of the natural cycles of the local environment.

In many cases this means finding out what the original local environment was like. This is often difficult, as in our cities and even in rural areas the landscape was significantly changed after European settlement.

Sustainable landscape means putting back much of what was in place before development. It may also mean introducing things that were not there before.

SITE

Sustainable landscaping is about more than planting Australian natives, 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.

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

Sustainable landscape may be used to control salination, help take up carbon dioxide 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.

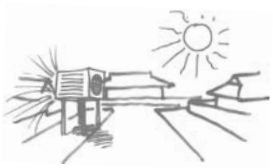
When choosing a site, take account of existing vegetation for windbreaks, shading and views.

Design landscaping to be experienced inside and out. 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 also supply food and help create pleasant areas for recreation. [See: 2.2 Choosing a Site; 2.5 Biodiversity On-site]

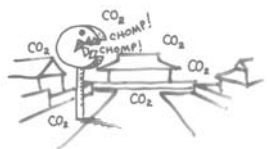
In recent years the definition of a sustainable landscape has evolved to include landscape elements that are literally part of a building. Many extensive green roofs are constructed specifically to support native and indigenous vegetation as part of a wider strategy for enhancing or replacing the natural biodiversity of a place or region. Often this kind of roof

This street needs ...

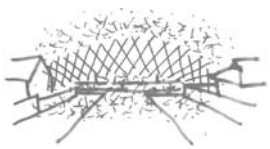
A pump to take up stormwater



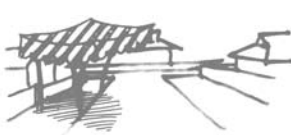
An airconditioner to improve the climate



A device to capture carbon dioxide



A dust catcher and air filter

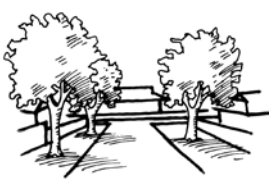


Shade from ultraviolet radiation

Wildlife habitat

Something decorative?

And low maintenance!



This street needs trees!

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 be seen as legitimate contributions to the creation of a sustainable landscape and may even be integrated into wastewater treatment systems. [See: 5.13 Green Roofs and Walls]

GROWING PLANTS

Sustainable landscapes use plants which perform well in the local area. Avoid native or exotic plants that are weedy in your region. 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 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.

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. Structural diversity will encourage wildlife into the landscape and prickly plants will provide shelter for small birds. Ensure wildlife are not compromised by domestic pets.

Native birds and reptiles can be protected from cats by keeping the cats indoors or in purpose built enclosures.

Growing fruit and vegetables is a way of reducing our ecological footprint. Most vegetables and fruit require fertile soils with good drainage, regular watering and moderate amounts of sunlight depending upon the climatic zone. Vegetable gardens can generally be provided in raised garden beds with the addition of home made compost and well rotted animal manures. Fruit and vegetables generally require regular drip irrigation.

Lawn is a common feature in Australian landscapes but it generally requires high levels of water, fertilisers and energy to maintain its 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.

A mix of native and exotic hardy plants replace lawn at this Canberra display home.

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: 5.13 Green Roofs and Walls; 7.3 Rainwater]

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: 7.6 Outdoor Water Use]

Vegetation can even take up effluent via sub-surface irrigation, especially in outer urban and rural sites. [See: 7.4 Wastewater Re-use]

The use of water bodies 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. Employ recycled materials wherever possible such as crushed brick/ concrete, recycled timber and products like recycled glass. Where 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. Following the saying "only pave where you sit, stand and walk!"

AIR

In a healthy house the inside and outside are designed to work together. Sustainable landscaping helps to maintain a healthy internal and external environment. Vegetation can be used to filter air from outside whilst indoor air quality is improved by selection of appropriate plants – some are able to take toxins like formaldehyde out of the air. [See: 3.3 The Healthy Home]

Vegetation can create buffers and filters for wind and dust control.

Look for a neighbourhood where sustainable landscape approaches are encouraged.

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.

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: 4.2 Design for Climate; 4.4 Shading; 4.6 Passive Cooling]

Shading needs to be seasonal and is best provided by deciduous plants. Australia has few deciduous native trees (the *Toona australis* or so called Red Cedar is one). Other 'deciduous' natives such as *Brachychiton* lose their leaves in summer and therefore can not moderate solar penetration to suit passive design. It is best to assume that most native vegetation will give permanent or semi-permanent shade. [See: 2.5 Biodiversity On-site; 7.6 Outdoor Water Use]

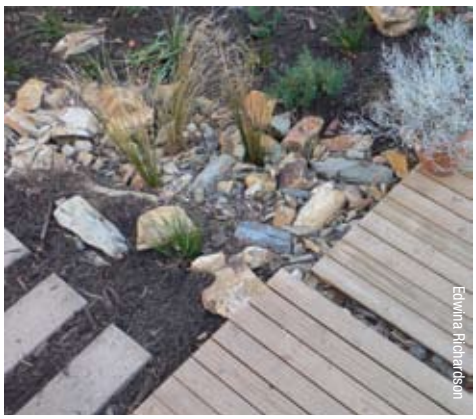
Captured rainwater or treated wastewater can be used to irrigate deciduous plants that contribute directly to a building's passive solar performance.

RESTORATION ECOLOGY

Particularly challenging sites occur where there is little ecological value or 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: 2.9 Challenging Sites]

Such strategies are particularly pertinent to urban sites where, very often, all the 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: 2.2 Choosing a Site]

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 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: 1.4 Carbon Neutral; 5.4 Biodiversity Off-site]



This dry creek bed is composed of waste rock excavated from a building site and obtained from a local landscape supplier.

CLIMATE CHANGE

Consider the predicted changes for your region and adapt your landscape accordingly. To cope with increased temperatures increase shade protection to homes using trees, large shrubs to shade walls and climbers. 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. Capturing water in rainwater tanks and through greywater recycling will ensure water is available to sustain plants during drought periods. Organic vegetable gardens will provide not only healthy food but 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 that has been artificially created for human purposes requires on-going maintenance and this should be factored into the overall picture of any home design.

ADDITIONAL READING

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