

Vegetation

OBJECTIVES

Vegetation is an essential part of the ecosystem. Seagrass for example, is eaten by micro-organisms, which are eaten by fish, which are then eaten by birds, marine mammals and humans. Seagrass washed ashore provides nutrients, shelter, food and nesting sites for fauna and stabilises dune sand. Without plants, many parts of the whole system cannot function properly.

Revegetation enhances diversity and stops land degradation. If vegetation in dunes is damaged, erosion can occur, as unstabilised sand moves with winds of only 15 km/hr.

Revegetation projects should try and recreate plants that were originally growing at the site, so that the whole system can work: animals can survive, feed and disperse seeds to continue the plant cycle.

Often, introduced plants are used in areas where they are inappropriate or have an impact on other naturally growing species. Revegetation projects should consider objectives, plants originally at the site, plant abundance, an appropriate species mixture, and ways to stop degradation and pollution.

Plants growing along coastal zones generally have a pattern of succession, reflecting differences in wave and wind energy. In foredunes, grasses and stabilisers are able to grow in the extreme climate and stop sand from drifting. In the mid and hind dunes, conditions become less harsh and other species can develop, including shrubs and small trees.

Although plants can be placed into 'zones', there is a lot of overlap and some dunes do not have an obvious pattern of succession.

Just over 840 perennial (easily detectable) plant species have been recorded along the coast of South Australia which represents nearly one-third of the total number for the State. Some species are cosmopolitan and are common throughout the State and can be

found in all coastal ecosystems. In contrast many are highly specialised and only grow in mobile sand in high salt spray areas. Individual plant species can be localised in the substrate or location relative to degree of salt spray.

ADAPTATIONS

Plants adapt to different environmental factors and vegetation along our coast has developed different strategies to cope with harsh conditions such as low moisture, sand burial, sand blasting, salt-laden winds and low nutrient soils. Some of the special methods used by native coastal and marine plants to survive are listed below.

Adaptations for dune plants

- As little fresh water is available and evaporation by the sun is high, plants can desiccate or dry out. Plants have adapted by having hairy or waxy coated leaves, or an ability to roll their leaves inwards to conserve moisture.
- Some plants are fleshy (succulents) to store water, or have woody stems to prevent water loss.
- Low growing shrubs and branches stop wind from undercutting soil at the roots.
- Spinifex grass, which grows on foredunes, is well adapted to poor nutrient soils. Freshly blown sand has higher levels of nitrogen than older sand; so as sand buries the grass on the dune, it is stimulated to grow by the fresh supply of nitrogen.
- Because water and nutrients usually drain quickly from the sand, roots can be shallow and fibrous to help bind the soil. Grass roots, for example, are usually confined to the top profile of the sand to catch rainfall or moisture stored by the organic matter. Other roots found are very deep. Good soil aeration allows deep roots to penetrate nearly 3 m.
- Burial by sand is another problem for foredune plants. Having roots that are near the surface of the soil allows leaves to remain near the surface. Some plant species are encouraged to grow when covered by sand. However, seedlings are often killed by these sand burials.

- Shrubs on foredunes are well armoured to endure salt-laden winds, often having hairy leaf surfaces or a waxy cuticle to prevent the entry of salt.

Further adaptations for coastal and marine plants

- Coastal plants with light coloured leaves reflect high temperatures and the burning sun.
- Salt marsh and mangrove species have specialised roots to grow in salty water and leaves that contain glands to secrete excess salt.
- Mangroves maintain seedlings on the parent tree until they are fully formed. The seedlings are then released into the seawater, with a better chance of survival.
- Seagrasses have special roots, or holdfasts, to attach to the sandy substrate.
- Some types of algae are fleshy and contain 'air bladders' to store oxygen when the plant is covered by water.

SOIL

Sand dune soils are quite different to the soil in your backyard. Sand consists of fine quartz and the calcareous broken shells of marine fauna. It is granular and also contains some silt and clay particles.

- The soil on foredunes is very loose, so it is readily moved by wind and makes plant growth difficult. Dune soils are also dry. Because sand particles are loose and have large air spaces between the grains, water and nutrients easily wash through and leach away.
- If coastal sands have very uniform and fine grained sand particles, then the sand has been thoroughly sorted. Deep sands are usually on dunes or flat sandy country extending inland. The soils usually extend for several metres down and need vegetation to be stabilised.
- Clay soils have a layer of black to dark grey sand. They are often waterlogged and although the surface can appear dry, the clay layer underneath is full of water. This type of soil is usually found around cliffs.

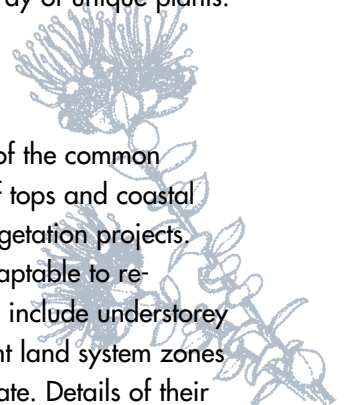
- Sands with a high amount of shell, limestone rock, soils or calcarenite, can be alkaline, ensuring the species range within these conditions is narrow.
- Siliceous sands at the surface are leached and whitish in colour. The soils generally have a low water holding capacity and are found on incipient dunes and the beach berm. Deeper layers are richer in colour from the organic matter.
- The yellow-brown coating of sand grains is iron and aluminium oxide. These can bind nutrients in the soil very tightly, preventing roots from using available nutrients.
- When plants grow on bare sand, the dropped leaves and bark decay to form organic matter, which eventually makes soil. The greying on the top level of the sand in heavily vegetated dunes is evidence of this organic matter. Soils with low organic matter will generally dry out faster than more organic soils.
- Foredunes suffer from a lack of major plant nutrients such as nitrogen, potassium and phosphorus.
- High nitrogen levels are contained at the surface of the ocean, so salt spray is often rich in nitrogen. Sea spray can carry nutrients for up to 3 km inland. However, the further inland and the older the dunes are, the less fertile the soil, as there is less spray and a greater leaching of nutrients from the soil.

HOW TO USE THESE FIELD GUIDES

Despite the extreme conditions that coastal plants have to endure, there is a surprising array of unique plants. The field guide is in two parts:

Part 1

This section introduces a number of the common coastal plants from the dunes, cliff tops and coastal wetlands. Most are useful for revegetation projects. They are the pioneers and are adaptable to re-establish coastal areas. The plants include understorey and overstorey species for different land system zones and are widespread across the State. Details of their range and usual habitat, type and use are noted for each of the feature plants. Techniques for the easily propagated species are also included.



Following the plant listing is a pictorial introduction to a number of the State's most common coastal native plants, that are important for revegetation projects.

Part 2

This section comprises identification keys to various groups of marine plants. It is a modification of Smith and John (1979) and includes:

- major groups of Southern Australian marine plants that are attached to rocks and sediments
- common seagrasses
- marine benthic algae
- common blue-green bacterial colonies found in the intertidal or just above high tide (brown and red algae).

If you have difficulty identifying some terrestrial or marine plant specimens you can take them to the State Herbarium which provides a free service for small numbers of plants (less than 10 specimens) for volunteer community groups. For priority identification and commercial organisations a fee is payable.

It is important that specimens for identification be posted after being pressed, dried, enclosed in paper and supported by cardboard. Specimens should definitely not be sent in plastic. Collection of good material with good locality information will help with the identification and provide material suitable for the Herbarium collection.

The Herbarium is at the Plant Biodiversity Centre, Hackney Road, Hackney 5069.

Telephone: 8222 9307, fax: 8222 9353.

A local botanist or members of the Australian Plant Society (formerly SGAP) can also help identify plants.

