# MANGROVES

*Vic Semeniuk, research scientist and consultant on coastal systems, specialising in tidal flats and mangroves.*

*Photographs by Cliff Winfield.*

Mangrove environments traditionally in the past were viewed as mosquito-ridden, swampy wastelands fit only for refuse disposal and land-fill. Perspectives, however, changed as coastal scientists unravelled the importance of mangroves to the coastal ecosystem. Mangroves provide several important functions in coastal environments. Firstly, they are very productive and provide plant material and detritus to support a wide range of consumers in mangrove environments, as well as fauna that inhabits environments adjoining mangrove areas. As such mangroves are a primary link in the food web that can involve a wide variety of fish and crustacea of regional coastal waters. Mangrove environments also provide habitats for a range of fauna such as insects, crabs, reptiles, birds and specialised mammals and, in addition, provide the valuable nursery beds for juvenile fish. Mangroves are important in shore stability. Coasts with well-established mangrove formations are less susceptible to coastal erosion than those that are cleared of mangrove.

## The Flora

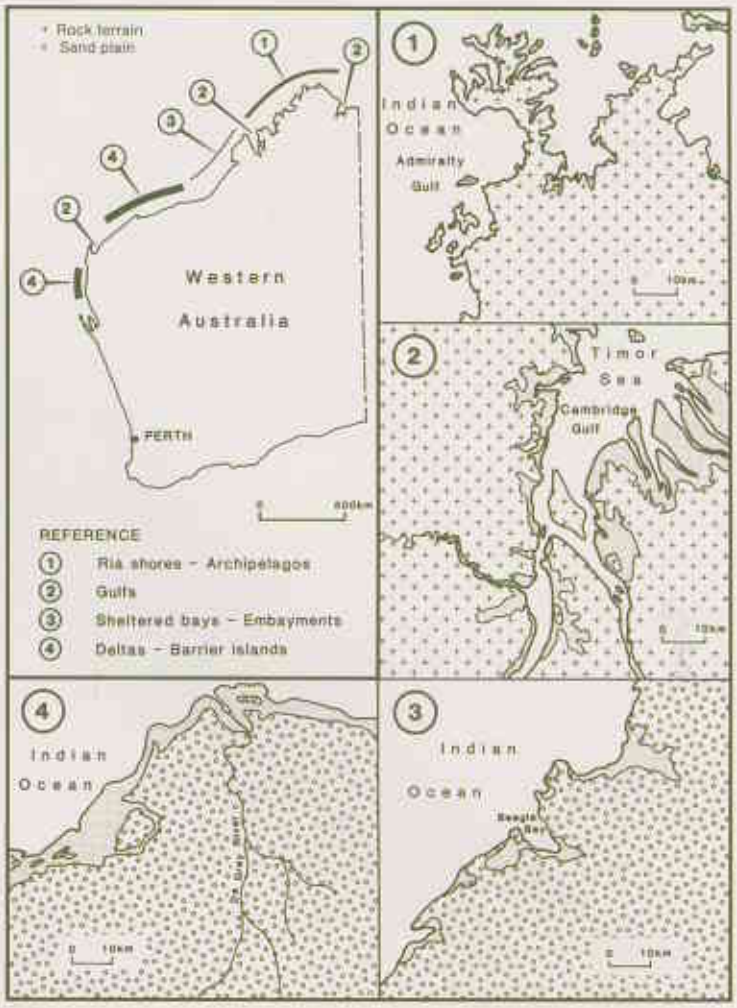
Mangroves, typically, are tidal zone trees and shrubs having a range of adaptions that enable them to survive and maintain their populations in the saline tidal environments. These adaptions include

features such as pneumatophores, which are specialised roots that function in aeration, stilt roots, salt-exuding glands, salt-excluding strategies, and viviparity, which is a feature of plants that have their seeds germinating within the fruit while still attached to the parent plant. Although there have been 17 species of mangrove recorded in W.A., only seven species are of significance in their contributions to mangrove formations. *Avicennia marina*, the white mangrove with its pencil-like pneumatophores, is the most widespread and common species throughout the mangrove systems of W.A. *Rhizophora stylosa* also is common, and is probably the most distinctive and familiar mangrove with its arching stilt roots.

*Ceriops tagal*, *Bruguiera exaristata*, *Aegiceras corniculatum* and *Aegialitis annulata* also are

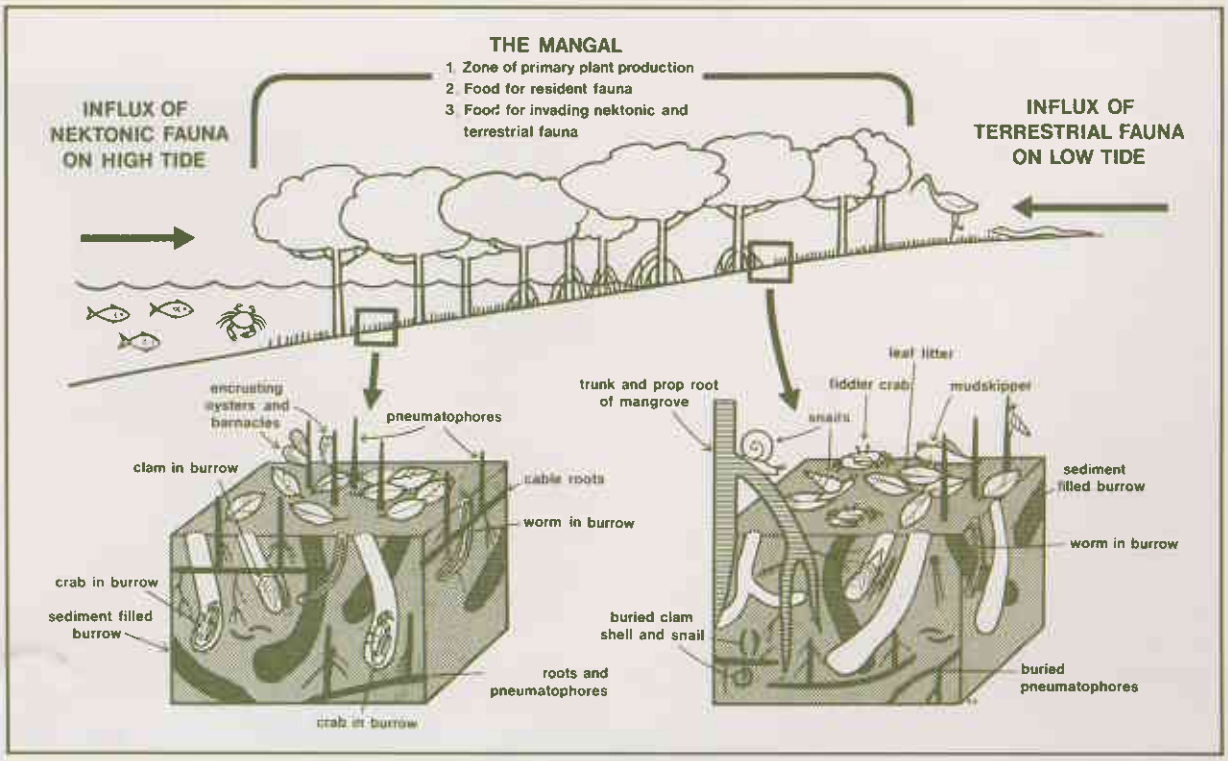
The pencil-like pneumatophores and the underlying pattern of the radial cable roots are clearly portrayed by this small shrub of *Avicennia marina*, growing on a rippled sandy tidal flat (above).

Typical interior of a mangrove forest (left). The mangrove *Avicennia* with its white bark is conspicuous here. The ground surface is littered with leaves and fallen branches, and the pencil-like pneumatophores are also evident.




The main zones and coastal settings of mangrove habitats along the tropical coast of W.A.

Generalised diagram showing the various important features and functions of a mangrove environment: marine, tidal and terrestrial ecological relationships, the animal habitats, and the effect of animals and plants on the soil.



common throughout the mangrove environments of W.A., and other species such as *Sonneratia alba* and *Camptostemon shultzii* are common specifically in northern humid areas. The remaining species of mangrove also occur in the northern parts of W.A. but tend to be restricted to small areas.

## Mangrove Systems in W.A.

The mangrove systems of W.A. span an enormous stretch of the tropical-subtropical coastline, extending from Bunbury in the south to the Northern Territory border and beyond in the north. Mangroves occur in environments with small tides, such as at Bunbury, but also occur in areas with large tides such as in the tropical northern regions. Their growth, however, is extensive only in the tropical regions where, apart from a few notable wave-dominated coastlines such as Eighty Mile Beach, they form a nearly continuous fringe along the coast.

The tropical coast of W.A. contains a large variety of different mangrove habitats, especially at the small scale. It is possible to categorise the coastline into distinct types of mangrove settings. Briefly, four major settings of coastline relevant to the development of mangrove habitats can be recognised. These coastline types are:

1. Ria shores-Archipelago settings
2. Delta-Barrier Island settings;
3. Sheltered bay/embayment settings;
4. Gulf settings.

Within each of these there is a profusion of smaller-scale habitats which may be restricted to, and distinctive of, a particular setting, e.g. small scale alluvial fans in ria shore settings, or beach ridges in deltaic settings. The combination of local features such as coastal landforms, soils, salinity, groundwater complexities such as fresh water seepage, and a range of physico-chemical processes develops distinctive habitats for the various mangrove assemblages. These assemblages essentially are collections or aggregations of mangrove species drawn from the regional species pool. Since there is also a marked gradient of physical and chemical features *within* habitats, the mangrove assemblages colonising them tend to be zoned, with distinct species, or groups of species occupying specific zones on the shoreface.

The subcontinental climate gradient in rainfall and evaporation which determines species pool, width of the mangrove formation, luxuriance of the mangroves, and maintenance of mangrove populations, also to a large extent controls mangrove distribution and composition. For instance, in the subhumid northern regions of W.A. there are up to 17 species of mangroves which form luxuriant, tall, wide formations; toward the south, species richness falls to three or four species, and mangroves form narrow, shrubby formations backed by extensive salt flats. As a result of the climate gradient, similar habitats in similar settings can have mangrove assemblages quite different in composition, structure, width and maintenance.

W.A. is fortunate that its vast mangrove system is largely left intact because of low pressures from the population. There are still extensive stretches of mangrove-lined shores utilised only by natural marine and coastal fauna. The degree of impact which has already taken place on mangrove systems is still quite insignificant when viewed from regional and subcontinental perspective. □

Mangrove environments, and their adjoining mud flats, support rich and diverse populations of wading birds.

# LANDSCOPE

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**COVER PHOTO**
Shipwreck at Broome (Jiri Lochman).

**EDITORIAL**

For more than 100 years W.A. has recognised the importance of protecting significant areas of its natural heritage.

Today, about 4.5 million hectares of our State is classified as national parks, vibrant natural museums ranging from the hardwood forests of the south-west to vast inland deserts that represent our unique terrestrial flora and fauna.

Until now, however, there has been a missing element: the marine environment.

Clearly, its absence has made our park system less representative of W.A.'s environment, especially considering that the State has some 12700 km of coastline.

Recently a start was made to address this imbalance with the official opening of the Marmion Marine Park, W.A.'s first marine park.

The primary objective in establishing this park, which is located on metropolitan Perth's doorstep, is to conserve significant examples of our marine heritage, and to encourage public understanding, appreciation and continued enjoyment of the marine environment in ways which will leave it unimpaired for future generations.

These same values apply to the proposed Ningaloo Marine Park which is situated along 260 km of the State's coastline south of Exmouth. Ningaloo will be vested in the National Parks and Nature Conservation Authority as a marine park in July.

Both of these marine parks not only allow for the development of proper management techniques to protect the marine environment, but also to enhance recreation.

Marmion reef has long been a popular holiday destination for many Western Australians who fished for the huge groper and crayfish offshore, and swam in the protected lagoons.

Ningaloo might be less well known because of its isolation, but the tourist industry is expected to promote this area of our coastline and the adjacent Cape Range National Park and, as a consequence, it will become one of the State's premier tourist attractions.

The establishing of marine parks will provide many benefits.

Some intangible, such as the knowledge that future generations will be able to appreciate areas of unspoiled natural beauty.

Others more tangible, such as the enjoyment of visiting a marine park.

There will also be benefits in terms of jobs created and the expansion of a growing and viable tourist industry.

Furthermore, marine parks will provide ecological benchmarks for research into natural processes and into the relative effects of marine and coastal uses.

W.A. has a responsibility to protect special marine environments and to encourage public appreciation of these areas now and in the future.

Our marine parks will do this.