FLORA

OF THE KIMBERLEY

Arid ranges, rugged sandstone escarpments, savanna, pindan, eucalypt-palm woodland, river gorges and pools - these and much more are found in the Kimberley. They provide habitats for a rich variety of plant species, many of which have been difficult to identify - until now.

Judy Wheeler describes these habitats, along with some of the challenges involved in producing the book Flora of the Kimberley Region, *which tackles the task of identifying the region's plants.*

by Judy Wheeler

The Kimberley region, of approximately 300 000 square kilometres in the remote northern part of Western Australia, is one of the great wilderness areas of the world.

The first recorded observations of the vegetation of this area were made by William Dampier, who anchored the ship *Cygnet* in King Sound in 1688. He described the soil as dry, sandy and lacking water, and the vegetation as being of several sorts of trees with long thin grass underneath. However, it was not until 1819-22 that the first botanical collections were made by botanist Allan Cunningham (see "Cunningham: A Man of Science" in *LANDSCOPE* spring 1992 issue), who explored the northern Australian coast with Lieutenant Philip King.

The flora of the Kimberley region is as diverse as is its topography. The landscape varies from arid sand dunes and sand plains to rugged sandstone escarpments, from the slow, meandering rivers of the lower stretches of the Fitzroy and Ord to turbulent streams and cascading waterfalls in the narrow gorges of such places as the Prince Regent River, King Leopold Ranges and Carson Escarpment. The vegetation varies from semi-arid grass savanna bordering the Great Sandy and Tanami Deserts to pockets of tropical rainforest and luxuriant riverine vegetation.

LONG DRY, SHORT WET

The Kimberley region has a long dry season (approximately eight months) of virtual drought, and only a short wet season with more than two-thirds of the area receiving a mere 250-800 mm of rain. The landscape varies from semi-desert sand dunes to sand plains and rugged ranges. These vast expanses are vegetated by tropical savanna grassland with a varying degree of tree or shrub cover. Common in the Dampier District is a shrubland known as pindan, which is dominated by thickets of *Acacia* species, sometimes with an upper tree layer of eucalypts.

In northern and north-western areas

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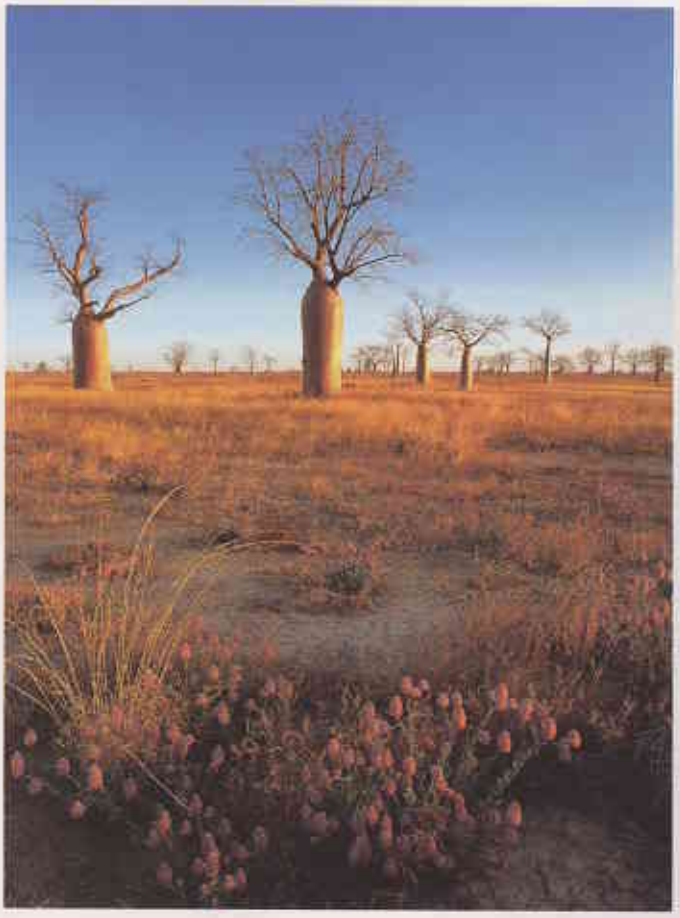
An undescribed fan palm (*Livistona* sp.) and ferns in El Questro Gorge.
Photo - Bill Bachman
Inset: Eucalyptus phoenicea.
Photo - Jiri Lochman

Right: The fan-palm *Livistona eastonii* dominates the lateritic surface of the Mitchell Plateau.
Photo - Marie Lochman

Below: Sandstone cliffs and woodland are features of the Hunter River gorge.
Photo - Jiri Lochman



Boabs *(Adonsonia gregorii)* and the mulla mulla *Ptilotus exaltatus* near Derby.
Photo - Bill Bachman

In still pools, the flowers of the aquatic water pincushion (*Eriocaulon setaceum*) are borne above the water's surface.
Photo - Jiri Lochman

there is more rainfall, up to 1600 mm in some places. These areas support woodland communities. On the Mitchell Plateau, for example, there is a eucalypt-palm woodland in which the fan-palm *Livistona eastonii* and cycads are common. Also, there are small but numerous pockets of rainforest.

Over recent years these patches of rainforest, comprising semi-deciduous vine thickets, have been discovered in the north-west of the Kimberley. These occur in gullies, on steep slopes of rugged terrain, along rivers and beside swamps as well as in the dune swales of coastal sand dunes. The rainforest patches are characterised by a dense tree canopy and climbing woody vines. In the wet season, when the canopy is dense, a humid microclimate develops in which other, more delicate species can grow.

The addition of water to the harsh landscape produces a complete transformation. Rivers dissecting the rugged landscapes provide a wealth of different habitats. There are steep-sided gorges with picturesque waterfalls, where a permanently humid microclimate has developed in an otherwise harsh land. Here may be found an array of more delicate herbs and ferns around waterfalls. Lower stretches of major rivers have deep freshwater pools often fringed by luxuriant growth of species such as cadjeputs (*Melaleuca* spp.), freshwater mangroves (*Barringtonia acutangula*), Leichhardt pine (*Nauclea orientalis*), several figs (*Ficus* spp.), rivergums (*Eucalyptus camaldulensis*) and screw-palms (*Pandanus* spp.). There are also shallow billabongs and swamps which abound with waterlilies (*Nymphaea* spp.) and other aquatic plants such as marshworts (*Nymphoides* spp.), bladderworts (*Utricularia* spp.), trigger plants (*Stylidium* spp.) and various sedges.

Where the major rivers meet the sea are often extensive tidal mudflats providing yet another different habitat, in which mangroves line the estuary and drainage creeks and cover the mudflats with species such as *Avicennia marina, Sonneratia alba, Aegiceras corniculatum, Aegialitis annulata*, and members of the family Rhizophoraceae.

LOCAL ALIENS

The Kimberley region has 2 085 species of vascular plants, of which only 108 species are naturalised alien species. In comparison the area around Perth has over 500 naturalised alien species; that is, approximately one quarter of the plants in the Perth region are not native to that area. Undoubtedly the low number of alien species in the Kimberley is largely due to the region's remoteness and the fairly low level of human disturbance.

Many plants of the Kimberley have closer affinities with plants of the Northern Territory and Queensland, and sometimes even to nearby areas of south-east Asia, than with the rest of Western Australia. Some of the 2 085 species also occur in the Pilbara, but many are not found elsewhere in Western Australia. The best-represented plant families in the Kimberley are the grasses (family Poaceae) with 259 species, the peas (family Papilionaceae) with 164 species, the sedges (family Cyperaceae) with 156 species, the wattles (family Mimosaceae) with 103 species, and the family Myrtaceae with 91 species (which includes the eucalypts).

Some Kimberley plants are so unlike the plants of the south-west of the State that they appear bizarre. One such plant is a deciduous tree, the boab, with an

unusual swollen trunk. The boab's trunk may be up to 25 metres in circumference and is adapted for water storage. These trees both puzzled and intrigued early explorers such as George Grey and Allan Cunningham. Other plants which may appear unusual are the palms and cycads. Such plants we may expect to find on tropical islands, not in Western Australia.

There are certainly a number of rare and endangered plants in the Kimberley, with more than 50 species on the Department of Conservation and Land Management's (CALM) declared rare and priority flora lists. Possibly more species should be added to these lists after further studies have been carried out on those species which are insufficiently known.

An example of a rare and endangered species is *Pittosporum moluccanum,* found only on the Dampier Peninsula; this is a small tree with sprays of tiny white flowers and conspicuous orange globular fruits containing minute black seeds. Also rare is the aquatic species *Nymphoides beaglensis*, which again may be found on the Dampier Peninsula in the shallow water of billabongs. The *Nymphoides* species has floating circular leaves and white to pinkish mauve-fringed flowers. Another rare species is one of the kurrajongs, *Brachychiton xanthophyllus*, which is a tree with hairy leaves, large pink down-covered flowers, and clusters of yellowish hairy seed pods.

READ ALL ABOUT IT...

Until recently, identifying plants from the Kimberley was a difficult task, with little recent literature being available. Now, all of the region's 2 085 plant species can be much more easily identified using the keys and descriptions contained in a newly published book of 1 327 pages, *Flora of the Kimberley Region*, produced at the Western Australian Herbarium by CALM staff. The four main authors were Judy Wheeler, Barbara Rye, Beverley Koch and Annette Wilson.

The team began work on the project late in 1986. Contributions from several specialists, some from CALM, one from Kings Park and others from elsewhere in Australia, were also obtained.

The preparation of the text for each species brought with it numerous challenges. Not least of these were the problems associated with describing in Perth the attributes of plants growing so far away in the remote northern Kimberley region; the authors had to adopt the ingenious method of re-creating the beauty of the Kimberley plant species from pressed herbarium specimens. This was done by gently heating the dried, shrivelled flowers in warm water until their tissues reabsorbed sufficient water to become somewhat three-dimensional.

The sticky kurrajong (*Brachychiton viscidulus*), often called Kimberley rose, produces bunches of sticky flowers when it loses its leaves.
Photo - Jiri Lochman

Rainbow bee-eaters perched in eucalypt near Fitzroy Crossing.
Photo - Bill Bachman

Herbarium specimens of all the 2 085 species were examined carefully, using a microscope to observe the minute and fascinating details which characterise each particular plant species. All the plant parts had to be minutely measured - painstaking work! The detailed observations were recorded in order to prepare a description of each species. Observations by the original collectors on soil type, associated vegetation and flowering time were also noted, along with the place of collection. The latter notes enabled the authors to determine the distribution of the various species.

The plant descriptions are based on the plant collections housed at the Western Australian Herbarium. Verification of the correct name to be assigned to the individual plant species often proved difficult. Many of the early historical plant collections, including the type specimens, are housed in England, other European countries or elsewhere in Australia. It would have been advantageous to compare these early specimens with those currently in Perth, but constraints of time and money prevented such globe-trotting. In accepting the current usage of names, however, the book is still a great advance over the previous work of George

Bentham, whose *Flora Australiensis*, completed in 1878, is the only other study to cover this enormous area.

Several talented artists produced 356 delicate black-and-white line drawings to illustrate the diagnostic features of most of the plant species in the area. In their minds, the artists had to reconstruct three-dimensional plants from the dried, flat, herbarium specimens in order to produce the exquisite drawings. Occasionally the writing team was able to supply the artists with additional pickled material to help their reconstructions, and we luckily managed to obtain fresh material of *Eucalyptus phoenicea*, which was air-freighted down to Perth for one of the artists, Pat Dundas, to prepare the delightful cover painting.

The handbook is intended to provide the impetus for further research, especially on those species where data is inadequate or which are in need of further study. There are undoubtedly a large number of plant species in the Kimberley region that occur nowhere else in the world. Exactly how many is difficult to say, but the number is almost certainly greater than 200 and possibly as high as 290. There are at least 60 species about which we have insufficient information or which are too poorly collected for us to decide if they are endemic (i.e. exclusive to the area). Further research is urgently needed on these species. Only then will we have the knowledge we need to conserve this great wilderness area in the north of Western Australia. ▣

Top: Sandstone escarpments above the Chamberlain River, whose banks are fringed with the silver cadjeput (*Melaleuca argentea*) and common cadjeput (*Melaleuca leucadendra*).
Photo - Bill Bachman

Above: The tropical triggerplant *Stylidium muscicola* often forms dense swards in damp seepage areas.
Photo - Jiri Lochman

Judy Wheeler, editor of *Flora of the Kimberley Region*, is a botanist with CALM's WA Herbarium and can be contacted on (09) 334 0500. In particular, she and the other authors would welcome any comments or corrections which should be made to the text.

Flora of the Kimberley Region is available from CALM offices and major bookstores and costs $89.95.

LANDSCOPE

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'Where there's fire there's smoke'. We look at one of the lesser known and misunderstood products of bushfires on page 10.

Banksias and blackboys are normally associated with the sandplains of the coast and wheatbelt rather than the Great Victoria Desert. See page 22.

The mountains of the Stirling Range are a refuge harbouring many ancient species of spiders. Spider expert Barbara York Main shows us some of them on page 28.

The disappearance of the Zuytdorp *remained a mystery for many years. The story of its rediscovery and the formation of the Zuytdorp Nature Reserve is on page 42.*

A new book, Perth Outdoors, *aims to encourage people to get outdoors and enjoy nature and to learn more about Perth's unique natural communities. See page 35.*

FEATURES

REGULARS

COVER

*The palisade spider (*Neohomogona stirlingi*) is endemic to the Stirling and Porongurup Ranges. It builds a shallow burrow with an open entrance surrounded by a palisade, or collar of leaves and twigs, which may project several centimetres above the ground or litter.*

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