Protecting the Kimberley's unique flora

One of the world's few remaining wilderness areas is found in the north Kimberley. Limited access due to the rugged terrain and torrential summer monsoonal rains has protected the region's wild nature, but has also limited our ability to document the region's diverse wildflowers and wildlife. Fortunately, the State Government's *Kimberley Science and Conservation Strategy* is now improving both science and on-ground management, enabling the Department of Parks and Wildlife to better protect the region's incredible flora.

by Greg Keighery

The Kimberley was once considered to be a relatively impoverished portion of the Australian tropical savanna flora. However, a series of major biological surveys carried out by the Department of Parks and Wildlife and its predecessors has shown a different story. Our knowledge of the Kimberley has blossomed, with the Kimberley now recognised (with the Arnhem Land Escarpment and Cape York) as one of three major northern biodiversity hotspots, and one of 15 biodiversity hotspots in Australia.

FILLING GAPS IN OUR BOTANICAL KNOWLEDGE

Documenting the flora of the Kimberley has proved challenging. Many plants only grow and flower for relatively brief periods in the wet season. We have been able to access the wet-season flora from boats along the coast and helicopters but, as technology has improved, better access in the wet season has improved knowledge. For example, in 1992 there were 11 orchids from nine genera known from the Kimberley, now there are 17 species known in 12 genera, with three species thought to be restricted to the Kimberley. All the new orchids are wet-season plants.

The *Flora of the Kimberley* was compiled in 1992. At this time 1977 species of flowering plants were known from the region, with more than 1600 present in the north Kimberley. Of these, 230 species (12 per cent) were regarded as endemic to the Kimberley, with 120 of these species only found in the north Kimberley. There are now 2140 species recorded for the Kimberley and 306 (14 per cent) of these are considered to be endemic. This increasing diversity is mainly concentrated in the high rainfall north Kimberley, which, with its diversity of invertebrates (particularly land snails), reptiles and mammals, is an Australian and internationally recognised biodiversity hotspot.

A number of habitats in the Kimberley are uncommon or rare, including some wetlands (clay pans, mound springs and seeps), Devonian limestone ranges and sandstone pavements. While only five flora species in the Kimberley are listed as threatened, we are also beginning to find that many Kimberley plant species have restricted ranges and these are being documented in conservation listings. Many of these plants are being listed as priority flora, meaning they are not yet well surveyed enough to be sure if they are threatened. These species could well be rare but we lack information on their populations and habitat. There are 483 priority taxa (priority 1, 2 and 3) listed for the region, of which 248 are priority 1. Priority 1 species are essentially known from only one or two populations, normally outside the reserve network.

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Another challenge is that many plants in the north Kimberley are newly recorded and unnamed. Even if we have all the information on threats, habitat and population size, the plants new to science need to be described and differentiated from others, at least informally, to enable them to be formally declared. Currently priority plants form more than 20 per cent of the known flora of the Kimberley. The priority 1 flora of the Kimberley makes up more than 10 per cent of the region's total flora and many of the plants are still to be formally described.

In southern Western Australia we can rapidly obtain information on potentially rare species, but this is difficult in the remote north Kimberley. Fortunately, we can still act to protect and conserve the unique and diverse wildlife and wildflowers of this wilderness, despite a lack of information.

LANDSCAPE-SCALE THREATS

The threats to the flora and fauna of the Kimberley are essentially inappropriate fire regimes, feral herbivores and weeds.

Large and intense fires in the late dry season have caused profound changes, by simplifying the structure and species composition of the savanna and pindan communities. Changes include the loss of species that regenerate after fires from

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Main Bar breasted honeyeater on a violet waterlily.
Photo – Alice Gillam/Sallyanne Cousans Photography
Inset left The wattle *Acacia hippuroides*.
Inset right The triggerplant *Stylidium costulatum*.
Photos – Greg Keighery/Parks and Wildlife

Above Stream-side vegetation in the Kimberley.
Photo – Simon Cherriman

Above right Kimberley rose (*Brachychiton viscidulus*).
Photo – David Bettini

Right Snow white orchid (*Dendrobium affine*).
Photo – Jiri Lochman

seed, reducing the quality of the habitats for our unique mammals and reducing the availability of fruits and seeds for human use. Many of the region's most unusual and restricted vegetation types, such as vine thickets, mound springs and other wetlands, are degraded by fire and cattle, which makes them more prone to weed invasion.

To address these threats we must rely on changing these on a landscape basis rather than on a species-by-species basis.

KIMBERLEY SCIENCE AND CONSERVATION STRATEGY

The State Government's bold vision for the region's long-term conservation – the $81.5 million *Kimberley Science and Conservation Strategy* (KSCS) – was released in June 2011. An important part of the strategy, known as the 'Landscape Conservation Initiative', is being implemented via partnerships between Parks and Wildlife, traditional owners, pastoralists and other key land managers including the Australian Wildlife Conservancy (AWC). This initiative aims to address threats such as fire, introduced animals and weeds across property boundaries.

Prescribed burns are being conducted in the late wet and early dry seasons to create a mosaic of burnt and unburnt areas across almost 20 million hectares of the north Kimberley. The resulting patchwork effect from these prescribed burns reduces the amount of fuel available and has resulted in fewer large, intense and damaging fires later in the dry season.

By managing the landscape-scale threats, we will protect many of the plants of the Kimberley as well. However, for highly localised plants, we need to understand the distribution, specific habitat requirements, life history attributes (time to flowering/seeding after fire, re-sprouting abilities) before detailed plans can be developed. If we manage the north Kimberley at a landscape scale, this will assist in keeping common plants common and restricted or rare plants secure.

Above Feral cattle eat plants and degrade habitat.
Photo – Jiri Lochman

Left The waterlily *Nymphea ondinea* subsp. *ondinea* is endemic to sandstone creeks of the north Kimberley.
Photo – Mike Lyons/Parks and Wildlife

Below left The mistletoe *Dendrophthoe acacioides*.
Photo – Greg Keighery/Parks and Wildlife

PREVENTING THE COMMON BECOMING RARE

Mistletoes are partial parasites growing as shrub-like plants on the branches of host trees. These plants typically have succulent fruits dispersed by birds. These fruits are significant food sources for birds and mammals and were used as sugary 'treats' by local Aboriginal people.

In the Kimberley there are 26 species of mistletoe, of which four are endemic. Twenty-three of these species are found in the north Kimberley. Despite the fact that Western Australian mistletoe expert Tony Start has searched for mistletoes in the Kimberley for more than 30 years, 16 species are known from less than 10 records. Nearly all of these mistletoes are killed by hot fires that kill the host tree.

Mistletoes survive in this fire-prone environment by growing on fire-safe hosts such as mangroves or figs, re-sprouting with the host, or via rapid re-colonisation through birds dispersing the fruits. However, if frequent large fires remove mistletoes over areas greater than the birds that disperse them can range, local extinction occurs and can spread over entire landscapes.

The KSCS's Landscape Conservation Initiative is reducing the severity of fire (changing the fire regime so there are less late season hot fires and more cooler early season fires that often scorch but do not kill the host trees), reduce areas burnt and protect fire-sensitive habitats (rainforest patches) and promote a mosaic of fire ages. All these should enable the Kimberley mistletoes to continue to thrive, as it meets their essential life history traits, rather than continuing to decline until they become truly endangered. This is keeping the common from becoming rare.

COPING WITH RARITY AND FIRE

Wattles are the largest genus of Australian plants, with more than 1000 species. In the Kimberley, wattles have been well studied with more than 160 taxa known, of which 85 are recorded from the north Kimberley. Thirty-seven species (44 per cent) are endemic to the area, of which 20 are priority taxa. These species are nearly all highly localised, only known from sandstone environments of the north Kimberley, especially centred in the Prince Regent National Park.

A fire response database is being developed under the KSCS. The database shows that approximately 80 per cent of north Kimberley wattle species are killed by hot dry-season burns and then regenerate from seed, needing at least three to seven years to reach maturity and set seed. Early dry-season burning being implemented under the strategy is creating a mosaic of burnt and unburnt areas, rather than hot late-season fires which completely burn out large areas.

These lower-intensity fires often leave fire-free areas at the bases of cliffs, on open sandstone pavements, in small protected valleys and on rocky riverine sites, where mature individuals persist. Therefore the strategy's Landscape Conservation Initiative should protect these poorly known species by limiting their major long-term threat.

FOOD PLANTS AND CATTLE

Waterlilies are still an important bush food. Aboriginal people grind the seeds

Right Prince Regent National Park is an important area for a number of highly localised species.
Photo – Carolyn Thomson-Dans/Parks and Wildlife

into flour, boil and roast the tubers, and eat the raw flowers and stems. They are common in fresh water wetlands, rivers and creek edges of the Kimberley. In 1992 there were thought to be only three widespread tropical species of waterlilies in the Kimberley. Now, eight of Australia's 17 waterlily species are recorded in the region. Three species are known only from the region.

Two waterlilies, *Nymphaea hastifolia* and violet waterlily (*N. violacea*), are widespread in freshwater wetlands, creeks and rivers, but others are much more restricted. *N. ondinea* has two subspecies, both only known from clear sandstone creeks of the north Kimberley, one between Kalumburu and Prince Regent River and the other only from the Mitchell River region. Feral cattle target waterholes in the dry season, eating these plants, destroying the edges, muddying eutrophying the water and encouraging weed invasion. Keeping feral cattle numbers low in this area will aid the continual survival of these major food and ornamental plants.

There are two major groups of Australian waterlilies: the small seeded and large seeded. These hybridise both within and between the groups, and the crosses occasionally produce new species such as the Kimberley waterlily (*N. kimberleyensis*), which is known from only a few waterholes in the north Kimberley and reproduces by spreading rhizomes. These waterholes are in pastoral country and will require more intensive management at a local level.

We now have better documented the occurrence of a number of localised species at specific sites that will need to be fenced off and protected from cattle. Management efforts and funding can therefore be targeted at both the regional and local level as information becomes available.

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ACHIEVEMENTS OF THE LANDSCAPE CONSERVATION INITIATIVE

Parks and Wildlife, in collaboration with traditional owners, the Kimberley Land Council, Aboriginal ranger groups, pastoralists and the AWC, has started to reverse the occurrence of damaging late-season bushfires across the north Kimberley.

Large and damaging late-season bushfires have been reduced by 52 per cent, through an expanded early dry-fire season prescribed burning program, establishing a mosaic of burnt and unburnt patches of vegetation to create refuges for wildlife, and enabling the region's biodiversity to recover.

Approximately eight million hectares of conservation estate, unallocated Crown land and Aboriginal Lands Trust land have been treated with prescribed burning annually (with approximately one million of burnt patches in mosaics across the landscape).

Since 2008, more than 16,000 cattle have been culled or mustered as part of the Landscape Conservation Initiative. This has been achieved through partnerships with traditional owners, pastoralists and non-government organisations. More than 200 traditional owners from groups including Dambimangari, Wunambal Gaambera, Wilinggin, Bunuba and Balanggarra have been engaged in on-country land management activities and training.

Protecting the fantastic flora of the Kimberley requires a landscape approach because of the widespread nature of the threats posed, limited access, high costs and the remote nature of this wilderness. Since the area is largely intact, this approach should protect both the rare and common as we learn and understand more about the plants of this world-class region.

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