Kouga Wilderness
a botanical appreciation

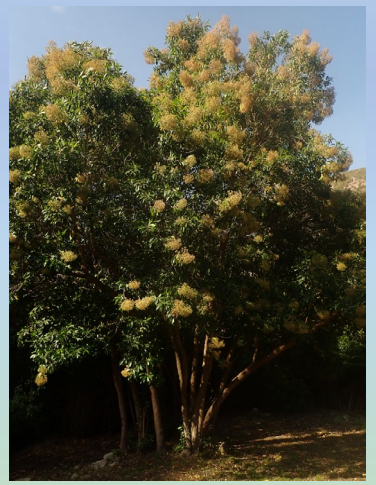
Kouga Wilderness is a 2 500-ha property nestled between the Kouga Mountains and Langkloof Valley in the eastern Cape Floristic Region. Its trenched and chiselled topography spanning a 600 m range from valley to peak, in tandem with an annual rainfall 350 to 700 mm, provides a great diversity of plant habitats, a home for three biomes and an estimated 600-700 species.

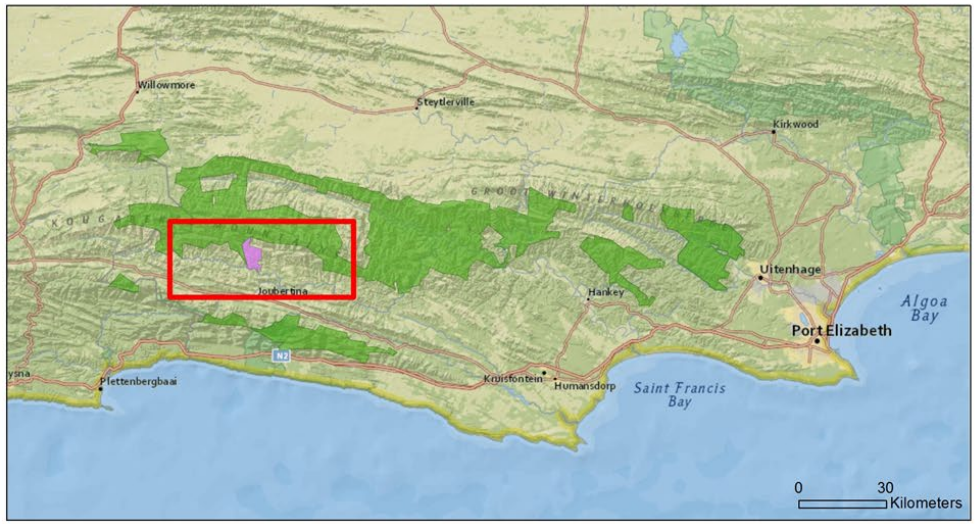
The property abuts the Baviaanskloof Megareserve, one of series of World Heritage Sites proclaimed to protect and showcase the hugely species- and endemic-rich Cape flora and fauna.

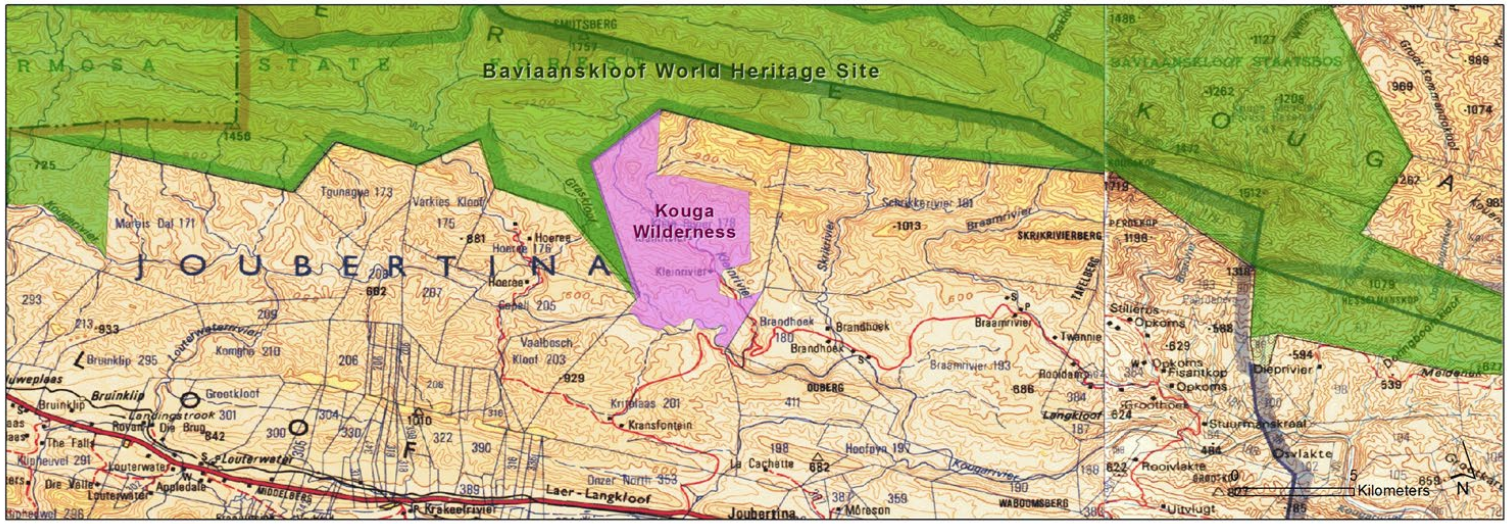
This photo essay is a brief introduction to Kouga Wilderness' plant life. My hope is that the stories herein will pique your curiosity about, and appreciation of nature's forms and flows in this beautifully wild place.

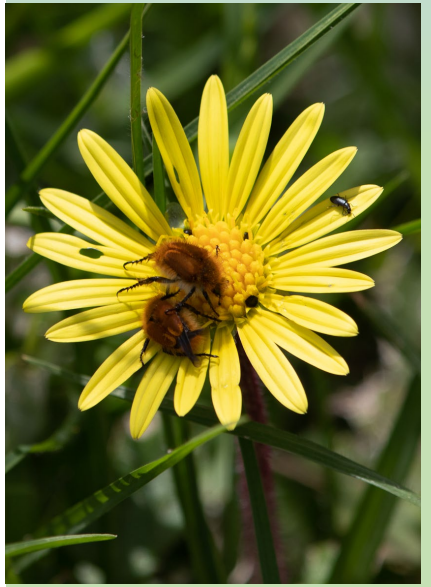
Words and photos by **Richard Cowling**
unless otherwise indicated

For accommodation and activities see:
https://www.kougawildernis.co.za/









The spectacular scenery of Kouga Wilderness is typical of the Cape Fold Mountains in the eastern part of the Cape Floristic Region. The ridges and peaks of the Kouga Mountains (background) comprise the most erosion-resistant sandstones, whereas the table-top plateaux are made up of softer rocks. The latter are remnants of the African surface that developed after the breakup of Gondwana, which birthed our continent.

After about 100 million years of erosion in a geologically stable setting, uplift of the crust caused by a hotspot below, rejuvenated the Cape's scenery. This resulted in the incision of the African surface and the scouring out of the sediments deposited in the ancient (early Cretaceous) canyon of the Kouga River and its tributaries.

Afromontane Forest covers a small part of Kouga Wilderness, being restricted to sites with permanent moisture and protection from fire. Consequently, forest is best developed along the narrow courses of perennial streams that occupy deep and rugged canyons.

Canopy trees grow as tall as 10 m, are mainly single-stemmed and vertical growing, and seedlings outnumber sprouts (ramets) on the shaded forest floor.

Common trees include *Cunonia capensis* Butterspoon Tree, *Cassine peragua* Forest Spoonwood, *Ilex mitis* Cape Holly, *Nuxia floribunda* Forest Elder and *Podocarpus latifolius* Real Yellowwood.

Rapanea melanophloes **Boekenhout**

Pelargonium peltatum Ivy Geranium

Carissa haematocarpa Karoo Num-num

Portulacaria afra Spekboom

Subtropical Thicket, like forest, occupies a small part of Kouga Wilderness where it is found in fire-protected sites such as steep slopes and along dry water courses. Valley Thicket (left) is rich in succulents, notably Spekboom but also aloes, euphorbias and crassulas. The dominant canopy species are hedge formers (low, multi-stemmed and often thorny shrubs). Mesic thicket (right) grows under higher soil moisture conditions and has fewer succulents. The dominant canopy species (Wild Olive, Candlewood) are lateral spreaders (plant height = plant width). In both thicket types, regeneration of canopy species is mainly via sprouts (ramets) from below-ground branches. Seedling are rare.

Thicket lineages started evolving 40-50 million years ago as the Earth became drier and cooler but before fire emerged as a widespread disturbance. A major selective force in the evolution of thicket lineages was browsing by the largest ever megaherbivores (extinct elephants and rhinos) that co-evolved with the pants.

Colpoon compressum Cape Sumach

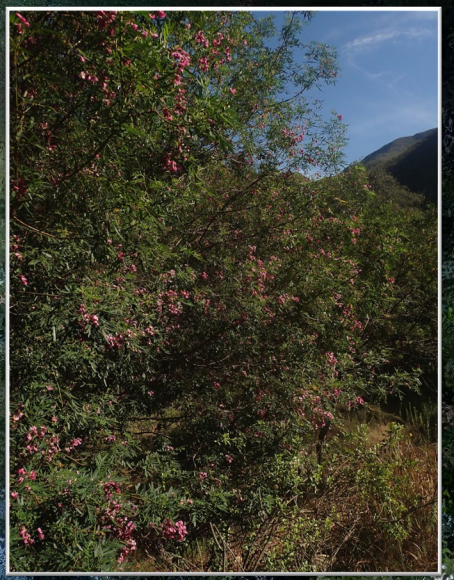
Gymnosporia buxifolia Common Spikethorn

Pittosporum viridiflorum Cape Cheesewood

Riparian or streamside ecosystems occur along the Klein River where its canyon floor widens, making it accessible to fire. Most of the plants are fire-dependent fynbos species with a scattering of forest trees that can sprout vigorously after fire, e.g. *Nuxia floribunda* Forest Elder.

Many of the shrubs have leaves that are strongly scented when crushed, suggestive of the use of chemical defenses against leaf damage by herbivorous animals that frequent these productive habitats.

The tea-stained, carbon rich water is home to many ancient insect groups, endemic to the acid, black waters of Cape streams. Not yet invaded by Black Bass so common in the nearby Kouga River, the headwaters of the Klein offer a haven to Cape freshwater fish notably *Galaxias zebratus* Cape galaxias and *Pseudobarbus swartzi* Gamtoos Redfin, which has a narrow distribution from the Kouga to the Van Stadens mountains. Both species are endangered.



Virgilia divaricata Keurboom

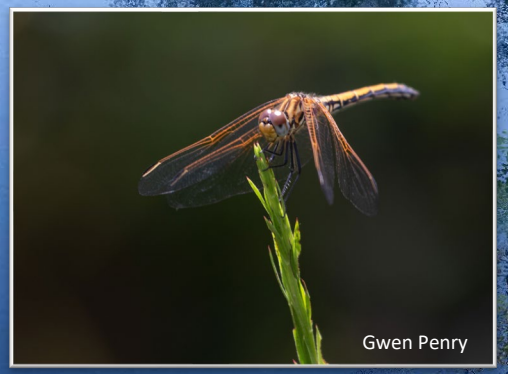
Restio paniculatus Broom Anglereed

Pelargonium panduriforme Oak-leaved Geranium

Justin Ponder

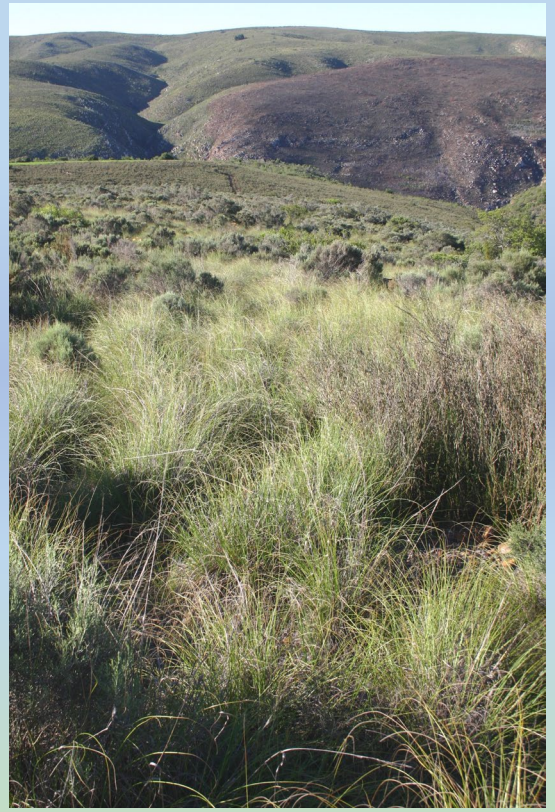
Erica caffra Water Heath

Helichrysum foetidum Stinking Everlasting



Gwen Penry

Trithemis sp Dropwing



Most of Kouga Wilderness is covered in Cape shrublands, namely Arid Fynbos (left) on the deeply incised canyon walls, Transitional Shrublands (non-fynbos types such as Renosterveld) (centre) on the plateaux where soils are more fertile, and Grassy and Mesic Fynbos (right) on the infertile and wetter mountain slopes. Arid Fynbos includes a multitude of different plant communities as determined by aspect, slope, soil texture and soil depth. The most arid vegetation occurs on steep, north-facing slopes, with shallow, sandy soils; the most mesic vegetation occurs on gentle, south-facing slopes where deep and relatively clay-rich soils have accumulated.

In the eastern part of the Cape Floristic Region (CFR), fynbos and transitional shrublands have a higher cover of grasses than do their counterparts in the western region. There are at least two reasons for this pattern.

Firstly, the soils of the eastern CFR are somewhat more fertile than those in the west. There are several reasons for this but I won't go into that here. Higher soil fertility opens the door to plants that shed their foliage in the unfavourable season and then regrow it again from perennial buds when conditions improve. Investing in a new set of leaves each year costs a lot of nutrients, that only more fertile soils can supply. This hypotheses also explains why most fynbos plants have leathery, evergreen leaves; the low soil fertility means that every leaf is expensive to make and this nutrient cost must be offset by having long-lived leaves that are tough enough to resist prolonged drought.

The second reason is the higher amount of warm-season rainfall in the eastern than the western CFR where rain is restricted to the winter months. This means that summer-growing grasses, the same species that dominate the upland grasslands of summer-rainfall southern Africa (e.g. Thatching Grass, Rooigras), have gained a firm toehold in this part of the Cape. They are especially common in transitional shrublands such as renosterveld.

Winter-growing grasses like Cape Wire Grass, which dominate the grass flora in the winter-rainfall west , are mostly restricted to cooler, poleward-facing slopes in Kouga Wilderness and elsewhere in the eastern CFR.

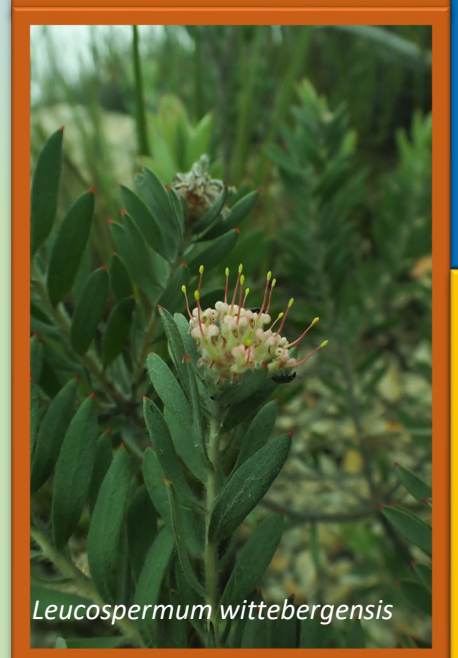
Daba Grass, a summer-growing species, extends deep into the winter-rainfall part of the CFR by dint of its habitat: the banks of perennial streams where soils remain moist year round.


Tenaxia stricta Cape Wire Grass


Miscanthus ecklonii Daba Grass


Hyparrhenia hirta Thatching Grass


Themeda triandra Rooigras



The fynbos flora of the Kouga Wilderness comprises groups of plants with different geographies in the CFR. These include species associated with the moist and mild **South Coast**, the drier and more torrid **Karoo Mountains**, species associated with the **South East** and those **Endemic** to the Baviaanskloof-Kouga region.

Crassula perforata Sosaties

Haworthia transiens Baloon Haworthia

Kouga Wilderness has a rich succulent flora concentrated in the Valley Thicket and Arid Fynbos of the canyon walls. Especially rich are the crassulas and mesembs, each with about 20 species.

Succulents range from large-bodied *Aloe ferox* and *Euphorbia polygona* to small-bodied haworthias and crassulas. Lacking are the tiny forms so common in the arid areas of the western, winter-rainfall CFR.

Rewarding habitat for succulentophiles are the steep, rock faces of shaded slopes where crevices may be stuffed with succulents, including cliff-face endemics or cremnophytes. The Baviaanskloof-Kouga region is possibilly the richest area in the world for endemic cremnophytes.

Adromischus cristatus Crinkle Leaf

Crassula atropurperea Purple Crassula

Pachypodium bispinosum Dikvoet

Haworthia cooperi isabellae Bristle Haworthia

Gwen Penry

The Arid Fynbos of the canyon slopes has a patchy cover of Common Sugarbush *Protea repens* (far left) In some places, the sugarbush forms dense stands overtopping other fynbos species (centre left); in other seemingly suitable places, there are no proteas to be seen. What causes this variation in the density of these plants?

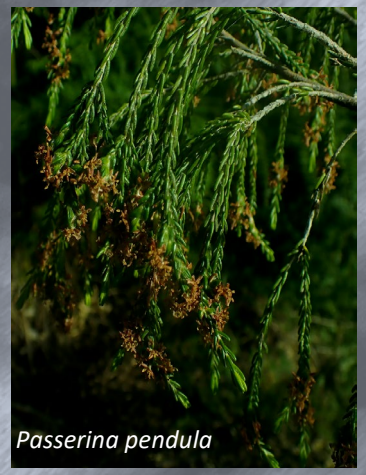
One reason is the variation in soil moisture associated with different aspects, slopes and soil depths in the complex canyon topography. Common Surgarbush prefers shaded (south-facing) slopes with deepish, albeit rocky soils, representing the mesic end of the soil moisture gradient associated with these canyon slopes. However, similar slopes may or may not have the proteas. So something else must be at play.

Cape proteas, like all other fynbos species, depend on fire to create the conditions for successful germination and seedling establishment. Thus, a hot, canopy fire through a stand of Common Sugarbush ensures that the cones stored on the plants, open to release seeds into the favourable post-fire environment. However, in the decades-long absence of fire, many proteas die (centre right), releasing their seeds into a hostile environment of seed-eating rodents, and competition for light from the dense fynbos understorey. Given that the complex topography of the canyon landscape limits the spread of fires, fire intervals are expected to be much longer there than in the less broken mountain landscape. So the variation in protea density could well be a consequence fire patchiness skewed towards fire intervals that are at the margin for what the plant can tolerate i.e. 40-50 years.

In more fire-exposed areas, protea patchiness can result from successive fires with intervals too short (3-4-yr) for flowering and seed production between fires, and the population crashes (far right)

Imposed open these fire interval issues is the low seasonality of the eastern CFR of both rainfall and fire incidence. In the western CFR, rains fall in winter and fires happen in summer. Not so here at Kouga Wilderness. Winters are often dry and fire-prone, especially during bouts of berg wind. The wettest times are spring and autumn. Unlike in the west, where winter and spring fires result in low numbers of seedlings, and summer-autumn fires produce bumper crops, season of burn has little effect on post-fire seedling numbers of proteas in the eastern CFR. Very high and very low seedlings per protea parent can occur after a fire at any time of the year. It all depends on whether the fire is followed by enough rain to enable the germination and establishment of protea seedlings. These largely unpredictable post-fire weather conditions almost certainly contribute to protea patchiness at Kouga Wilderness.


Muraltia squarrosa


Passerina pendula


Aspalathus kougaensis


Aspalathus usneoides

The Arid Fynbos of the valley slopes includes many examples of wand plants, those with slender, “wand-like” stems that extend high above the surrounding vegetation. What is responsible for this unusual plant architecture?

One hypothesis is that the pliable stems of wand plants prevent access by rodents to the flowers and seeds of the plants, which are costly to produce. However, wand plants include many species that produce an abundance of small flowers and minute seeds (e,g, *Passerina pendula* top right), likely of little interest to marauding field mice and vlei rats.

An alternative hypothesis is that wand architecture is designed to maximize movement of the stems during still weather. This movement results in the breakdown of the gaseous barrier layer around leaves, thereby enabling them to transpire water vapour and cool down. This makes a great deal of sense in the wind-protected canyon environments where temperatures can regularly exceed 40^{o}C in summer. Wand plants may be an adaptation to deal with overheating.

Evidence for this hypothesis comes from two sources. Firstly, wand plants have their highest diversity and abundance in drier and hotter fynbos of the inland mountains and valleys. And secondly, species that show a cushion-type architecture, with densely packed stems, in cool and windy places (coasts and peaks), adopt a wand-like architecture in warm and wind-protected environments. Examples include *Muraltia squarrosa* (top left) and *Osteospermum imbricatum.*

An iconic wand plant is *Aspalathus usneoides* (bottom right) confined to a small section of the Kouga River valley downstream of Kouga Wilderness. This species’ close relative *A. kougensis*, which is widely distributed in Kouga valley and surrounds, has some valley populations that are experimenting with wand architecture as this drooping-stemmed individual (bottom left) at Kouga Wilderness shows.


So get out there and go exploring. Abandon your stress to this beautiful place. There is so much to discover