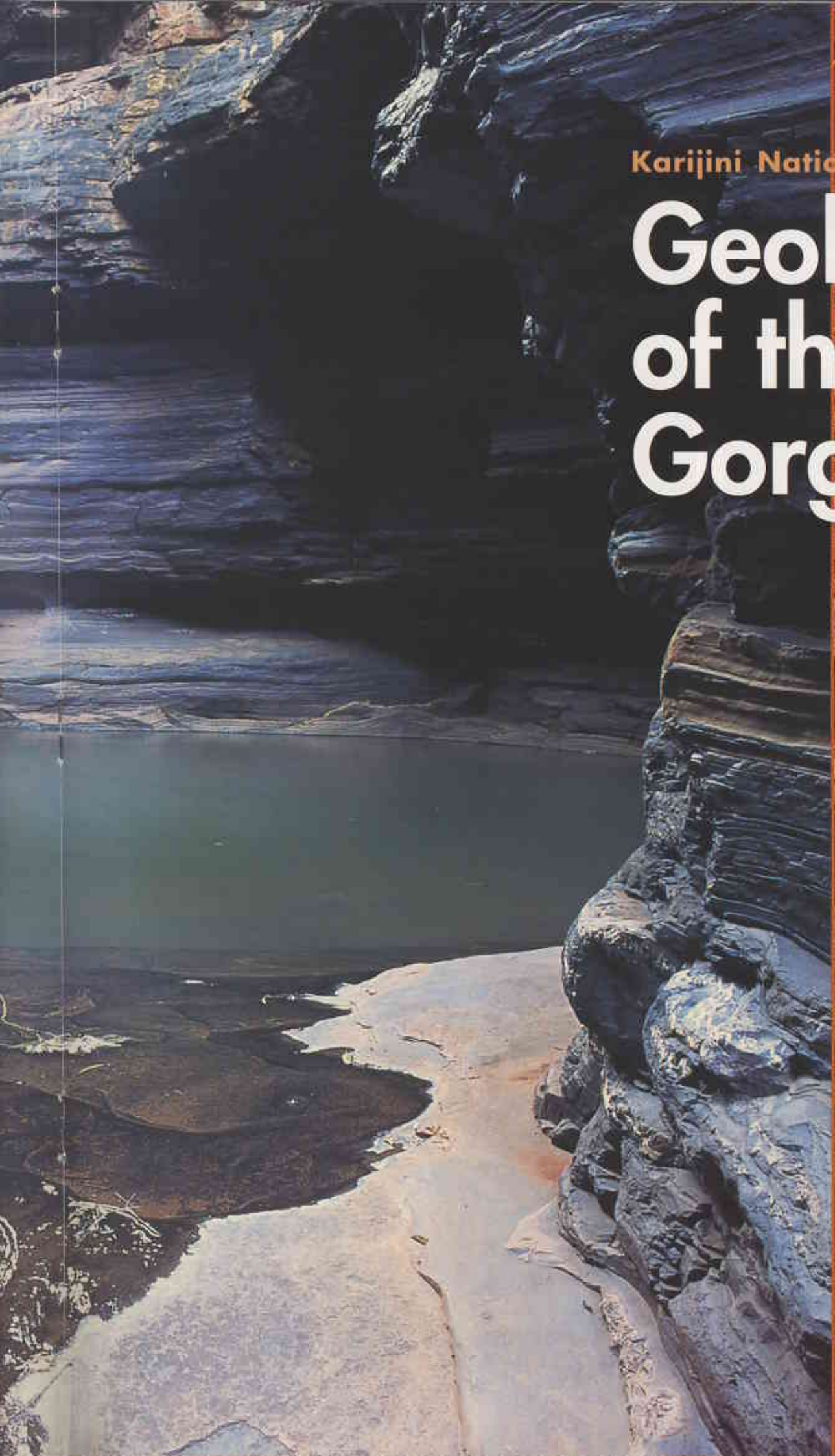


Karijini National Park

Geology of the Gorges

In the north of Karij
National Park, sma
creekbeds, hidden i
the rolling hillsides
and dry for most of
the year, suddenly
plunge down chasn
up to 100 metres
deep. Further
downstream, the
gorges become wid
and their sides char
from sheer cliffs to
steep slopes of loos
rock. The gorges ar
refreshing retreat fr
the arid plains abov
They also have a
fascinating geologic
history.

By Alan Thorn

The stark beauty of Karijini National Park results from a unique combination of geology, climate and natural vegetation. Of these, geology has probably had the greatest influence in shaping the landscape.

Rocks exposed in and around the gorges originated as fine-grained sediment, which accumulated on an ancient sea floor around 2500 million years ago. At this time, conditions on Earth were quite different from the present day. The atmosphere contained much less oxygen, and the only forms of life were simple bacteria and algae. Many of the sediments laid down in the oceans were unusually rich in iron and silica.

Over many millions of years, the iron-rich deposits were transformed by the pressure of further sediments laid down over them. Water, which had been trapped within, was driven out of the sediments, and they gradually turned into tough, well-bedded rock.

Later, horizontal compression caused the rocks to buckle and develop numerous vertical cracks, called joints, before being lifted to the surface to form dry land. Erosion over millions of years finally sculpted the rocks into the present day landscape. Similar iron-rich rocks occur in other countries such as South Africa, the United States and Brazil, but they are nowhere better exposed than in the gorges of Karijini.

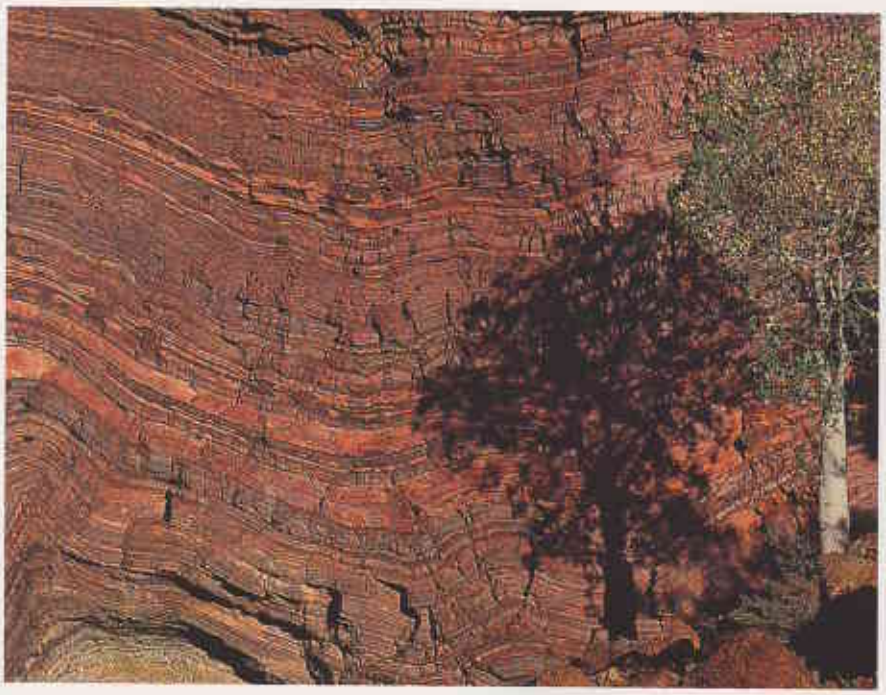
Previous page
Main photo: Plunge pool at Hancock Gorge.
Photo – Chris Garnett

Below: The alternation of weak and resistant rock types results in a slope and step appearance. Shale and dolomite form the gentle slopes, with steep cliffs of iron formation.
Photo – Bill Bachman

THE ROCK LAYERS

Three types of rock are especially common in the area of the gorges. Banded iron formation is a hard, brown-weathering rock composed of thin bands of iron oxide and fine-grained quartz. It is often weakly magnetic and this can be tested by visitors to the park with a small compass or magnet. Large open-cut mines in the banded iron formation, at nearby Tom Price, are a lucrative source of iron ore. Dolomite, a grey or pale brown rock similar to limestone, can also be seen. Where the surface of this rock is broken, it has a sugary appearance and, unlike banded iron formation, it can easily be scratched with a knife. Shale, a very soft, purple or pink rock which is often faintly banded, is also exposed in the gorges.

These deposits are stacked on top of one another, rather like layers on a cake. The thick dolomite in the cliff face overlooking the town of Wittenoom is known as the Wittenoom dolomite. Other rock layers, consisting of many tens or even hundreds of metres of strata, overlie the Wittenoom dolomite. These are the Mount Sylvia formation,



Above: Banded iron formation at Hamersley Gorge is folded due to ancient horizontal compression.

Top right: Banded iron formation with thin, alternating layers rich in iron oxide and fine-grained quartz.

Centre right: Banded iron formation outcrop showing a characteristic stepped appearance.

Right: Thinly bedded banded iron formation fractured along numerous joint surfaces.

Photos – Bill Bachman

which contains shale and banded iron formation, the Mount McRae shale and the Brockman Iron Formation.

Generally, throughout the northern part of the park, the rock layers tilt gently to the south. In the central part of nearby Wittenoom Gorge, however, the beds buckle upwards to form a broad arch known as the Garden Gorge Anticline. Just north of this feature, the rocks dip gently to the north.

Fossils of microbial mats have been found in the Wittenoom Formation and stromatolites have been found elsewhere. They have been built by some of the earliest forms of life on Earth. Many microbes have cells with sticky surface coatings which trap sediment grains like fly-paper, and, in some microbes, cells are able to join together to form filaments that can intertwine and trap sediment. As a result, microbial communities can construct cohesive mats, composed of both sediment and organic material. However, because of the great age of the rocks (which pre-date more advanced forms of life), no other fossils have been found. Although concentric rings seen on the surface of some beds, such as at Red Gorge, were once thought to be fossil jellyfish, they have since been shown to be the flattened remains of inorganic nodules.

THE PRESENT LANDSCAPE

Although the Hamersley Range has existed for hundreds of millions of years, most of the landscape features we see today were formed in comparatively recent times, that is, during the last tens of millions of years. This period of erosion began when a sharp drop in sea level caused the rivers to downcut rapidly to a new base. This process was enhanced by the onset of a more arid climate, which depleted the protective vegetation cover on the valley sides.

Former valley floor sediment, known as pisolite, now stands high above the level of the present-day river bed at several localities, for example, at Circular Pool and Dales Gorge. It consists of cemented iron-rich gravel and was formed before the recent phase of active downcutting began. Relict slope deposits, consisting largely of cemented fragments of banded iron formation, also date from this time.

By providing lines of weakness and resistance to erosion, the underlying rocks have greatly influenced the form of the landscape. Many creeks have exploited joints and other fractures cutting across rocks. These watercourses are characteristically straight and often parallel to neighbouring valleys, such as the lower Wittenoom Gorge and Bee Gorge. Angular creek junctions occur in areas where two or more directions of jointing are present. A good example of this is at the junction where Weano, Red, Hancock and Joffre Gorges intersect.

Soft, easily eroded shale and dolomite, occurring beneath the main iron formation layers, have enabled the creeks to cut back rapidly into the Range. Spectacular gorges and waterfalls are the result. Plunge pools occurring at the foot of many of the falls, such as Circular Pool and Joffre

Above: Joffre Falls. A combination of joints and easily eroded shale and dolomite beneath the iron formations have enabled the creeeks to cut deeply into the Range.
Photo – Greg Harold

Below: The semi-precious stone tiger-eye is found at Karijini.
Photo – Bill Bachman

Falls, are a valuable source of permanent water in the park.

The characteristic slope and step appearance of many valley sides also results from the alternation of weak and resistant rock types. Shale and dolomite generally form the gentler slopes, while iron formation outcrops are marked by notches and steep cliffs.

ASBESTOS MINING

Blue asbestos was first discovered in the Hamersley Range in 1908. However, it was not until the late 1930s that serious attempts were made to extract the mineral. This was used to manufacture fireproof articles, building materials such as fencing and roofing and as brake lining. It generally occurs in thin veins within the iron formation, in seams parallel to the layering of the host rock. Attempts to mine asbestos were hampered by the limited size of the veins and their flat-lying nature. Numerous small-scale operations took place on the valley sides, and involved the removal of small amounts of overburden above the seams. Underground mining took place at three locations: the Colonial and Wittenoom mines in Wittenoom Gorge, and the Yampire Mine in Yampire Gorge. The last of these operations closed in 1966. Sadly, a number of miners and their families, who were exposed to asbestos fibres, have subsequently died from asbestosis, an inflammation of the lungs caused by the inhalation of asbestos particles. The State Government has consequently cut off all services to the former asbestos mining town of Wittenoom. This is aimed at discouraging people from living there or visiting the area, as tailings which are still present around the town are regarded as dangerous.

The semi-precious stone, tiger-eye, occurs within the park. It forms during the weathering of asbestos, when the fibres are replaced by silica.

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LANDSCOPE

VOLUME FIFTEEN NUMBER 1, SPRING 1999

In 'Photographing a Temperate Wonderland' (page 10), photographers Sue Morrison and Ann Storrie share their experiences .

In 'Those Spotted Things' (page 22), we see how fox-baiting and captive breeding continues to swell populations of this popular native mammal.

Snakes. You either love them or hate them, but how do we live with them? See story on page 45.

Many farmers and landowners are turning to plantation pine for a variety of good reasons. Five of them tell us why. See 'A Crop of Forests' on page 38.

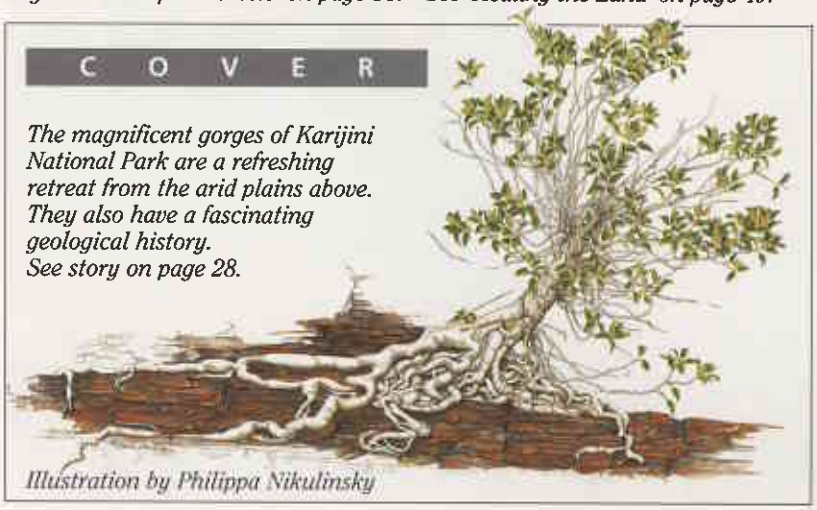
As habitat changes, so do species populations. But just when does a species become threatened? See 'Healing the Land' on page 49.

FEATURES

REGULARS

COVER

The magnificent gorges of Karijini National Park are a refreshing retreat from the arid plains above. They also have a fascinating geological history. See story on page 28.



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