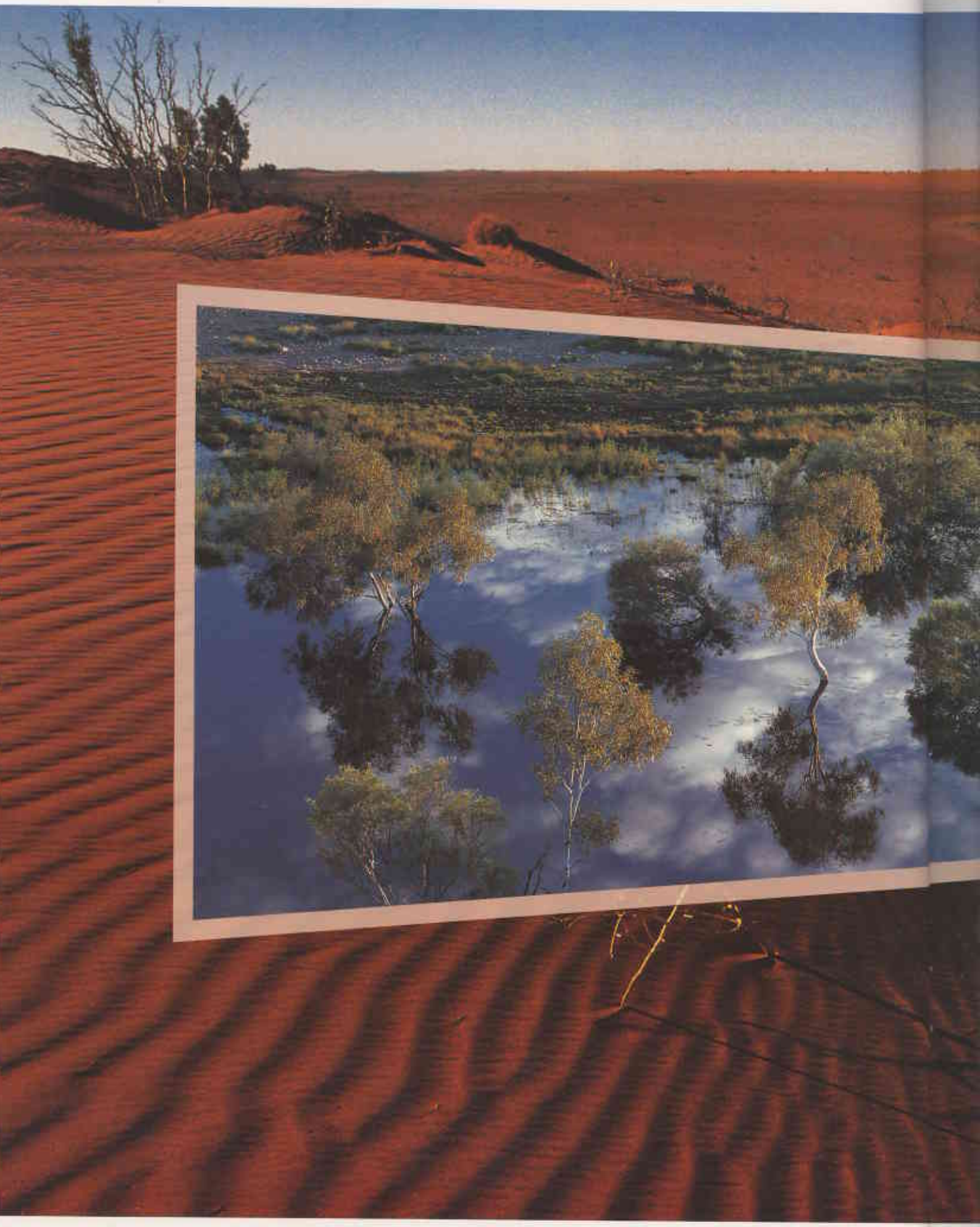
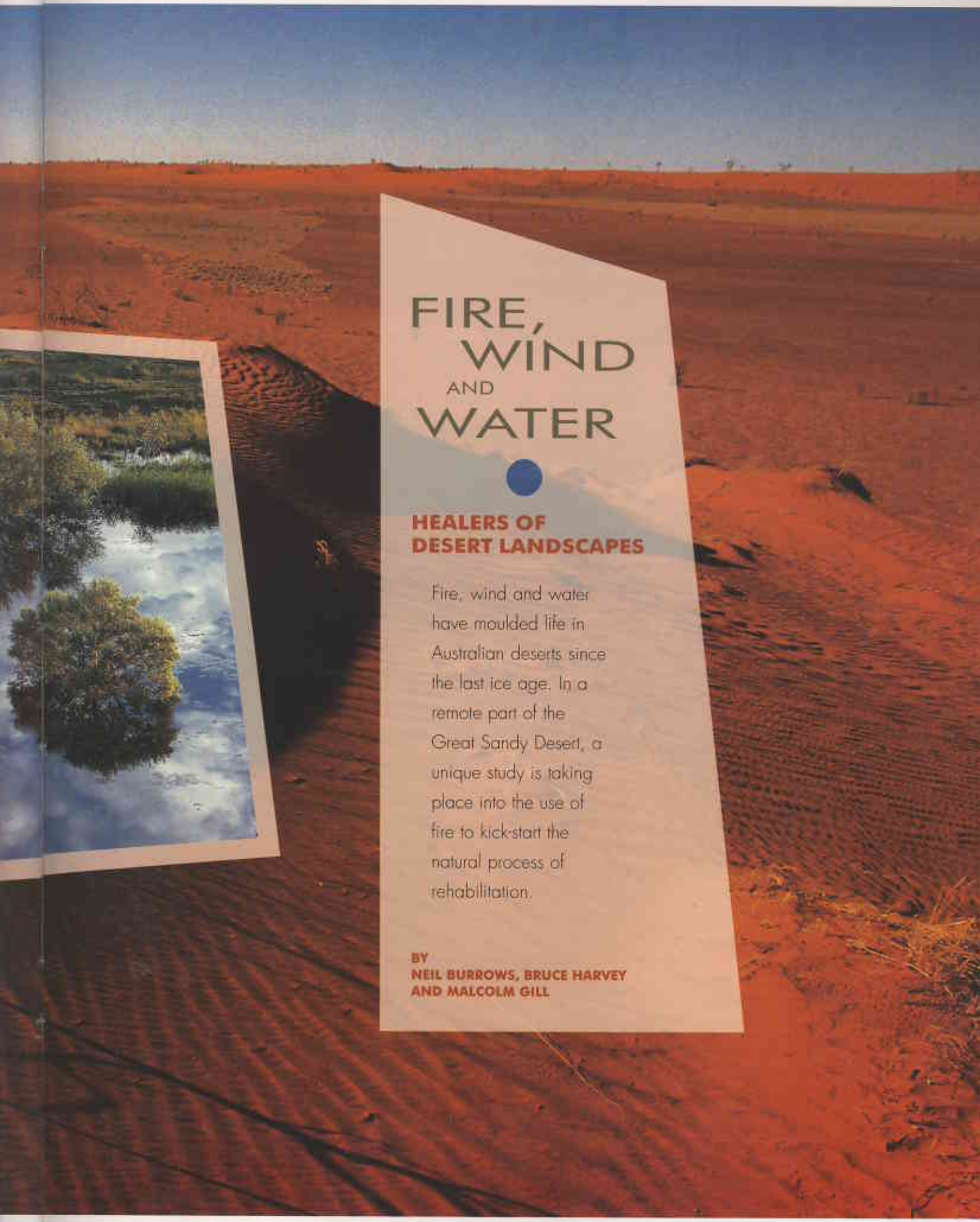




FIRE, WIND AND WATER

HEALERS OF DESERT LANDSCAPES

Fire, wind and water have moulded life in Australian deserts since the last ice age. In a remote part of the Great Sandy Desert, a unique study is taking place into the use of fire to kick-start the natural process of rehabilitation.

BY
NEIL BURROWS, BRUCE HARVEY AND MALCOLM GILL

Since European settlement, the remote and harshly beautiful deserts of Western Australia have lured explorers in search of pastures and precious metals. In the 1800s, Giles, Warburton, Carnegie, Forrest and other hopefuls led expeditions on horses and camels into the unknown and inhospitable interior. Since the 1950s, explorers using helicopters, bulldozers and trucks have searched the desert for tell-tale signs of oil and minerals. In the Great Sandy Desert, abandoned seismic lines and exploration tracks, which criss-cross the sand plains and dune fields, will take decades to revegetate. While some of the exploration tracks are useful for land managers and park visitors, many are ecological

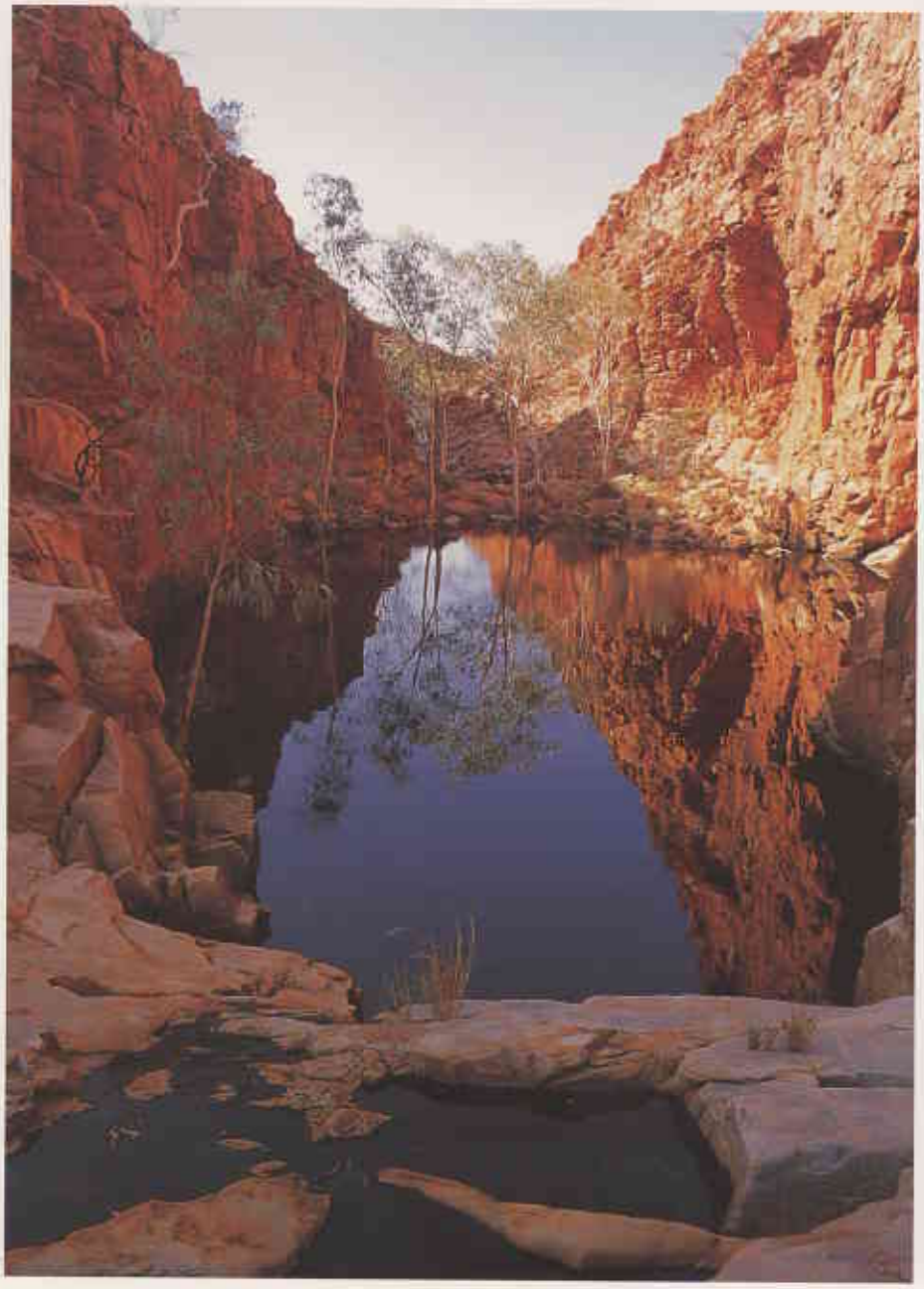
intrusions and a hazard to wandering outback motorists who can become lost in the maze of tracks.

The only national park in the Great Sandy Desert is the Rudall River National Park. Declared in 1977 to conserve its unique landscape and wildlife, it covers 1.6 million hectares and is second in size only to Kakadu, the biggest national park in Australia. It stretches from Hanging Rock in the west to Lake Dora in the north-east, and embraces the headwaters of the Yandagooge Creek and the entire drainage basin of the Rudall River.

The Rudall River is part of a large and spectacular desert drainage system, but it is also an increasingly important source of minerals. Mining and exploration have been allowed in the area since 1977, but with appropriate restrictions. Careful management of mining developments is required so that environmental health is maintained, and to ensure that the wishes of local Aboriginal communities can be realised.

The old, less precise methods of exploration, which resulted in the criss-cross of seismic lines and exploration tracks, have been overtaken by modern satellite, airborne and other remote surveying techniques that help to pinpoint more accurately, and thereby dramatically reduce, the size of areas for physical exploration. Use of these techniques has meant that drilling by CRA Exploration Pty Ltd (CRAE) in the Rudall River National Park during the past 10 years has disturbed about one per cent of the park's area. As exploration is completed, CRAE begins to rehabilitate the land, and where this occurs within the national park it will be monitored by the Department of Conservation and Land Management (CALM).

Once the tracks have been closed and rehabilitated, regeneration of ephemeral plants can be rapid, depending on rainfall. However, regeneration of woody shrubs and the return of the disturbed areas to a full community can take many years. This is particularly the case in areas of spinifex and acacia sand plain.



Previous page
Main: Dunes in a burnt area of the Great Sandy Desert.
Photo - Chris Garnett
Inset: Great Sandy Desert after flood.
Photo - Marie Lochman

Left: Desert Queens Bath in the Rudall River National Park.
Photo - Marie Lochman

KICK-STARTING THE ENVIRONMENT

CALM and CSIRO scientists, supported by CRAE and local Aboriginal communities, have been investigating techniques for rehabilitating exploration tracks. For example, fire has the potential to accelerate the rehabilitation process. CALM scientists and CRAE geologists have observed that in some instances exploration tracks in areas burnt by wildfire quickly revegetated after rain, and within a relatively short time had become virtually invisible. Scientists believed this was because of the combined effects of the elemental agents fire, wind and water.

A collaborative experiment has seen CALM, CSIRO, local Aboriginal people and CRAE join forces to investigate the role of fire in rehabilitating old exploration tracks in the Rudall River area. When the processes are better understood, it might well be possible to use controlled fire to restore disturbed areas to a full community of plants and animals in a much shorter time. As well as conservation benefits, managing fire in this manner provides an opportunity for Aboriginal people to participate in an economic activity on their own terms, while at the same time ensuring that important connections with the land and traditional skills are fostered and maintained.

Assisted by a nearby Aboriginal community, several small experimental fires were set in September 1992 to rehabilitate old exploration tracks. The structure and composition of the vegetation was measured before burning. Immediately after the fires, sand traps

EXPLORATION AND REHABILITATION

In 1972, CRA Exploration Pty Ltd (CRAE) began exploring for a range of minerals in ancient metamorphic rocks along the Rudall River system in the Great Sandy Desert. The area was opened for exploration and mining, with strict safeguards to protect the environment, in the year it was declared a national park. In 1985, CRAE discovered the Kintyre uranium deposit straddling the park's northern boundary.

Other mineral discoveries in the region include the giant Telfer gold mine and the rich Nifty copper deposits north of the park. Along with other important geological clues, these discoveries indicate an emerging world-class mineral province.

In close consultation with the Department of Conservation and Land Management (CALM) and local communities, CRAE aims to explore and mine part of the land. When each stage of exploration is completed, CRAE intends to restore the land to a condition similar to that before exploration began. Rehabilitation takes place both inside and outside the park, but such work in areas within the national park will be closely monitored by CALM.

Above left: A light touch: helicopters are used when mineral exploration sampling is carried out.
Photo - Jiri Lochman

Above right: Auger rig specially designed to reduce machinery impact on vegetation and animals.
Photo - Jiri Lochman

Right: Aerial view of fire-induced vegetation patterns in Little Sandy Desert.
Photo - Jiri Lochman

and erosion pins were established on the burnt areas, on the exploration tracks within the burnt areas, and on adjacent unburnt areas to measure and compare the movement of soil and seed blown around by the strong desert winds. The regeneration of vegetation on and off the exploration tracks is being carefully monitored.

PREPARATION: FIRE AND WIND

Fire has been a natural component of desert ecosystems for eons. It has been started naturally by lightning strikes and, until recently, by the traditional burning practices of Aborigines, for whom fire was an important and versatile tool and a vital part of their culture. In the past, much of the desert landscape was an interlocking mosaic of vegetation at different stages of regeneration, from recently burnt through to long-unburnt patches. Desert plants have evolved a wide range of adaptive traits to survive and regenerate in a fire-prone environment. Many species re-sprout following fire, which prepares some seeds for germination by cracking their hard, protective seed coats. Other species regenerate from seeds buried in the soil or encased in protective woody fruits.

Sand plains and dune fields of the Great Sandy Desert are covered with dome-shaped hummocks of flammable spinifex. Important for reducing wind erosion, they also trap wind-borne sand and seed. Fire temporarily denudes the land of vegetation, making the soil vulnerable to erosion and exposing the sand and seed once more to the strong desert winds.

Top: CSIRO and CALM scientists establishing sand traps and erosion pins to measure soil and seed movement after experimental fires.
Photo - Jiri Lochman

Above left: An environmental consultant assessing vegetation prior to an experimental burn to encourage regeneration on mining exploration tracks.
Photo - Jiri Lochman

Above right: A fire stick being used to burn spinifex in a rehabilitation study area.
Photo - Jiri Lochman

Left: Fire temporarily denudes the landscape of vegetation, allowing winds to redistribute soil and seed trapped by spinifex clumps.
Photo - Marie Lochman

In the first few weeks after the small experimental fires were set to rehabilitate the exploration tracks, hundreds of tonnes of sand and ash, and thousands of seeds that had accumulated beneath the spinifex hummocks, were redistributed by the wind. There was virtually no soil or seed movement on unburnt areas. Wind-blown soil and seed from the burnt areas accumulated on the exploration tracks, and the level of the soil surface on the tracks increased by up to five centimetres. The extent of sand drift after the fires varied, depending on the clay content of the soil, with most soil and seed movement occurring on the sandy soils. Within a short time, a firm crust began to develop over the soil surface, reducing further wind erosion of soil.

Seeds blown by the wind and perhaps prepared for germination by the heat of the fire lie buried in the sand awaiting the third and most critical element - water.

THE HEALING RAIN

Rainfall in the Great Sandy Desert is erratic and, although the annual average is about 200 mm, long droughts are not uncommon. The timing and the amount of rain are critical to the germination and development of seedlings. An assessment of seedlings on the exploration tracks after one year revealed that in the unburnt area there were no established seedlings of spinifex and shrubs, but in the burnt area there were numerous seedlings of these species. The density and diversity of seedlings on the tracks in the burnt area were not as high as was anticipated, but the low summer rainfall probably contributed to this.

Deliberately setting fire to rehabilitate areas disturbed by mining exploration, or to create buffers against severe wildfires, or to improve habitat, requires a firm understanding of the way in which fire behaves - when the spinifex will burn, how rapidly the fire will spread and how intense the fire will be. Wind and rain, for example, affect the flammability of the spinifex fuel. Further experiments are planned for September 1994, when small fires will be studied to develop models for predicting fire behaviour.

This unique experiment has already demonstrated that fire could play an important role in rehabilitating areas disturbed by mining in the arid zone. Future research will examine, in more detail, the processes of soil movement and seed dispersal on different soil and vegetation types. If fire is to be used in a safe and controlled manner, it is essential that the behaviour of fire under different conditions of weather and fuel is well understood. This knowledge can be used in the planning and implementation of mineral exploration activities throughout the arid zone to further minimise the impact of these activities and to rehabilitate old exploration tracks.

Top: Pebble-mound mouse emerging from its nest in the Rudall River National Park.
Photo - Babs and Bert Wells

Above: The Rudall River.
Photo - Jiri Lochman

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Hand in hand with nature. This brushtail possum is just one of the animals studied during fauna surveys of the Batalling Forest. *See page 16.*

Lush vegetation and a welcoming smile greet you as you arrive at Mt Hart Homestead, the 'Oasis in the Leopolds'. *See page 48.*

LANDSCOPE

VOLUME NINE NO. 4 WINTER ISSUE 1994

'Fire, Wind and Water', on page 42, tells of recent research into the rehabilitation of exploration tracks in the Rudall River area of the Little Sandy Desert.

Deep beneath the Southern Ocean lies the wreck of the Sanko Harvest. *This rotting hull is now an artificial reef attracting marine life and divers alike.* *See page 23.*

Plantations of brown mallet in the early 1900's began a chain of events that resulted in the 'Woodland Wonderland' of Dryandra. *See page 28.*

FEATURES

REGULARS

COVER

Woylies prefer clumped, relatively open vegetation with sandy soils that are easy to dig. They are found, among other places, at Batalling Forest and the Dryandra Woodland. See stories on pages 16 and 28.

The illustration is by Philippa Nikulinsky.

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