
WORLD HERITAGE NOMINATION - IUCN TECHNICAL EVALUATION

PURNULULU NATIONAL PARK (AUSTRALIA) - ID N° 1094

1. DOCUMENTATION

- i) **IUCN/WCMC Data Sheet:** 5 references
- ii) **Additional Literature Consulted:** State Party nomination document **Nomination of Purnululu National Park**, Environment Australia 2002, plus a September 2002 supplementary information document and attachments; **Bungle Bungle Range, Purnululu National Park, East Kimberley, Western Australia: a guide to rocks, landforms, plants, animals and human impacts**, D. Hoatson et. al. Commonwealth of Australia 1997; **Watching the grass grow (vegetation regeneration Purnululu NP) CALM Landscape 13 (2): 23-27**, Behn, G. et. al., 1997; **Assessment of the vertebrate fauna of the Bradshaw (Juliki) Field Training Area, Northern Territory**, Fisher, A. & Woinarski, J., 2002, Northern Territory Parks and Wildlife Commission; **Karst Geomorphology and Hydrology**, Ford, D. and Williams, P. 1989; **Purnululu National Park World Heritage Cultural Values**, Kirkby, I & Williams N. 2001, Unpublished report to Environment Australia; **Dictionary of Karst and Caves**, Lowe, D. and Waltham, T. 2002, British Cave Research Association; **Geology and landforms of the Kimberley**, Tyler, Ian 2000, CALM 2000; **Quartzite Karst in southeastern Venezuela, International Journal of Speleology, 2: 309-314**, White, W.B., Jefferson, G.L. and Haman, J.F. 1966; **A survey of the wildlife and vegetation of Purnululu (Bungle Bungle) National Park and adjacent area**, Woinarski, J.C.Z. 1992, CALM, Research Bulletin 6; **Proceedings of the Asia-Pacific Forum on Karst Ecosystems and World Heritage**, Wong, T. et al. 2001, UNESCO/IUCN Miscell. Pub; **A global review of solutional weathering forms on quartz sandstones**, Earth-Science Reviews 42:137-160. Wray, R.A.L. 1997; **Tower karst in sandstone: Bungle Bungle massif, Northwestern Australia**, Young, R.W. 1986. *Z. Geomorph. N.F.* 30(2):189-202; **Sandstone landforms of the tropical East Kimberley region. Northwestern Australia**, *J. Geology* 95: 205-18. 1987; **Quartz etching and sandstone karst: examples from the east Kimberleys, Northwestern Australia**. *Z. Geomorph. N.F.* 32(4): 409-23, 1988.
- iii) **Consultations:** 5 external reviewers. On site consultations with Environment Australia; CALM; CSIRO; Traditional Aboriginal Owners, Purnululu Aboriginal Corporation (PAC) and the Council's anthropologist. Pre- and post-visit consultations with IUCN/WCPA experts; Melbourne University; CALM; Kimberley Land Council, Broome; CALM anthropologist; Shire of Hall's Creek; Ord-Bonapart Program, Kununurra; and Aboriginal & Torres Strait Islanders Council.
- iv) **Field Visit:** Paul Dingwall (IUCN), Kevin Jones (ICOMOS), August 2002.

2. SUMMARY OF NATURAL VALUES

The nominated property is the 239,723 ha Purnululu National Park (PNP) (IUCN Category II), located some 300 km south of Kununurra in the East Kimberley region of the State of Western Australia. Together with the adjacent 79,602 ha Purnululu Conservation Reserve (PCR), the park was created in 1987 out of the Ord River Regeneration Reserve, established in 1967 to overcome the effects of land degradation following more than 50 years of pastoral farming. The park comprises four ecosystems:

- The deeply dissected Bungle Bungle Range composed of Devonian-age quartz sandstone eroded over a period of 20 million years into a series of beehive-shaped towers or cones, whose steeply sloping surfaces are distinctly marked by regular horizontal bands of dark-grey cyanobacterial crust (single-celled photosynthetic organisms). The towers, many of which are remarkably symmetrical, are most numerous and impressive on the eastern and southern flanks of the massif. They also occur as small isolated clusters arising from the surrounding plain and studding the eastern summit of the massif, the latter possibly relict from an earlier tower-forming period. On the southern flanks, the towers are cut by a labyrinthine system of very narrow gullies separated by flat-floored, mainly streamless, depressions opening out on to the plain.
- The grassy Ord River valley system on the eastern and southern border regions of the park, draining two tributaries from the south and three from the north of the uplands.
- The broad sand plains extending between the uplands and the river, composed of infertile black soils with open woodland and grasses.
- The more extensively wooded limestone ridges to the west, and neighbouring Osmond Range to the north.

The region experiences a dry monsoonal climate characterised by two contrasting seasons: a very hot, wet summer (November-March) which receives all the annual rainfall (600 mm) usually as erratic, intense and localised thunderstorms, and a warm, dry winter (April-October). There is little dry season stream flow or permanent water except for pools in the main river and well-sheltered gorges, or at springs in permeable rocks.

The park's vegetation reflects its transitional location between the northern tropical savannah (Torresian) and inland arid desert (Eyrean) biogeographical regions. Some 17 vegetation communities are recognised according to moisture availability, ranging from closed forests in the gorges and valleys, through open forests in riparian areas and open woodlands of drier areas to stunted shrublands and grasses in the driest uplands and surrounding plains. The dominant vegetation is open woodland and spinifex (spiny hummock grass) grassland with many eucalypts, acacias and grevilleas, notably silver leaf bloodwood, and rough leaf range gum. The closed forest communities, which are extensions of northern monsoonal forests, include palms, ferns and orchids. In all, 653 plant species are recorded from the Purnululu area, including 628 higher plants (of which 597 are native), 17 ferns and fern allies and 8 species of lower plants.

The diversity of animals in PNP also reflects the mixing of tropical and desert species. The recorded fauna of the park and surrounds totals 298 species of vertebrates, including 149 birds, 81 reptiles, 41 mammals, 15 fish and 12 frogs. Among the arid land animals are skinks, monitor lizard and short-eared wallaby, while the wet area representatives are varieties of frog, the pale field rat and large-footed mouse-eared bat. The last of these exemplifies species at the southernmost (inland) limit of their range, while others such as the desert mouse and

nocturnal burrowing skink reach their northern limit in Purnululu. The park also harbours rare animals such as the grey falcon, and seasonally migrating birds.

3. COMPARISONS WITH OTHER AREAS

The term *karst* is used in the nomination document and some of the supporting references to describe the erosional sandstone features found in PNP. At least one other reference, Hoatson *et al.*, refutes the karst description, and one reviewer has referred to the “somewhat confused” scientific discussion on the issue of sandstone karst. It is therefore worth briefly reviewing the issue. The term *karst*, and the phenomenon to which it refers, has a very long and complex history extending over many centuries and many cultures. Essentially, *karst is a land system that has been shaped, at least largely, by chemical solution* (Ford and Williams 1989: 1, 29, 43; Lowe and Waltham, 2002: 22-23, 33). But as in virtually all geomorphic processes, solution rarely occurs in isolation from other processes. Thus, other forms of erosion including mechanical removal of particles often accompany it, and usually the two or more processes involved are well integrated. Much of the confusion arises from the fact that many textbook discussions, and even some definitions of the term link it with limestone – the most frequent occurrences are in limestone or other carbonate rocks (indeed the word ‘karst’ derives from the limestone regions of the Balkans). It is also common to emphasise the place of caves, even though there are many occurrences of karst in a wide range of rocks that do not include caves.

White *et al.* (1966) first demonstrated the occurrence of karst in quartzites and quartzitic sandstones. It is now widely recognised that both quartz and amorphous silica are soluble in water, particularly at high temperatures. However, solution is much slower than in many other rocks such as the carbonates, gypsum and salt. Amorphous silica, which often forms the ‘cement’ in siliceous sandstones, is more soluble than crystalline quartz, and it is the amorphous form that has been dissolved at PNP and so liberated the sand grains for mechanical erosion.

A global review of 26 quartz sandstone landscapes (Wray 1997) reveals many karst features such as tower fields, especially in tropical regions. The best-documented and most spectacular tower karst is found on the surface of the flat-topped table mountains (or tapuis) of the Canaima National Park World Heritage site in Venezuela. While this is the most imposing cavernous sandstone region in the world, including the presence of 10 of the 12 deepest caves, the karst features are confined to solution on joints and fissures, producing deep, vertical shafts. Similar sandstone karst landscapes are well-displayed on the Chimanimanie Highlands on the Zimbabwe/Mozambique border, which has the deepest caves in Africa, up to 350 m deep, and in the Vila Velha region of S. Brazil. Sandstone karst with towers and caves is also found in the immense tablelands of the Central African Republic; the Tibetsi region of Chad; in S. Nigeria, in the Saharan region of E. Niger and in South Africa’s Cape Peninsula. None of these are currently within strictly protected areas or World Heritage sites. The Wulingyuan Scenic & Historic Interest Area of China, a World Heritage site, has spectacular sandstone karst features but these form a so-called “ruiniform” relief, comprising angular pillars and pinnacles in vertically-jointed terrain, unlike the cone-shaped towers of PNP. Similar landscapes also exist in the nominated Three Parallel Rivers of Yunnan Protected Areas in China, also being considered by the Committee at its 27th session. Another area of eroded sandstone, of much greater extent and variety, exists in the National Parks of the Canyonlands of Arizona and Utah, USA. However, this is a “high desert,” with elevations ranging from 1,000 metres to over 2,000 metres above sea level.

Within Australia itself, particularly in the north, there is also a large area of sandstone tower karst including the:

- flat-topped, ruiniform relief of the Arnhem Land Plateau, Northern Territories;
- irregular towers in the Burt Ranges, Spirit Hill, Elephant Hill and Hidden valley, northeast of Kununurra, Western Australia;
- symmetrical hills of Watarrka National Park and Keep River National Park, Northern Territories;
- small (6 m high) towers in horizontally bedded quartz sandstones of North Queensland; and
- towers (or “pagodas”) in Monolith Valley south of Sydney, New South Wales.

However, in the above cases the tower karst is smaller in scale and different in terms of geological make-up and landform evolution from that in PNP. PNP owes its distinctive character to the great age and continuing stability of the Western Australian shield and to the character of the lithology. The dominant rounded hill landforms, often described slightly inaccurately as tower-karst, but better termed cone-karst, are in fact at a relatively mature stage of the karst cycle and are by far the best example of this landform in quartzitic sandstone, virtually to the point of being unique. They are present probably because (a) they have been formed over a period of 20 million years (or perhaps longer) and (b) the liberation of sand grains by solution of the amorphous silica, followed by the removal of the sand by monsoonal rains, has accelerated the process of erosion. Further, the stabilising effects of the cyanobacterial crusts have probably supported and maintained the shape of the hills, and this also appears to be a unique feature amongst quartzitic karsts.

Topographically, quartzitic karst landscapes are very similar to those in carbonate rocks, though a systematic comparison has not been made. Thus, the Bungle Bungle topography is similar to the limestone tower karst of Australia’s West Kimberley region. Although karst landscapes are represented in 41 existing World Heritage natural, cultural and mixed sites (Wong et al. 2001), with only two exceptions (Canaima and Wulingyuan) they are developed in carbonate rocks. Although the Bungle Bungle Range has features similar to many other areas of the world, its distinctiveness derives from its scale and the specificity of its geomorphic evolution. It is this that justifies its claim to outstanding universal geological and conservation value.

4. INTEGRITY

4.1. Site integrity

The nominated property includes the full extent of the Bungle Bungle massif, the park’s predominant natural feature. The massif is also well-buffered by protected land on all sides, including sand plains within the park, and extensive riverine country and ranges of the Purnululu Conservation Reserve (PCR) to the west. The PCR is reported as having natural and cultural values of national importance, and it is managed consistently with the national park. In fact, it includes a greater diversity of landforms and vegetation than the park, with more permanent water, and is likely to have significant prehistoric settlement sites. The long-term objective of incorporating the PCR into the park should be pursued to completion. Priority should also be given to expanding the park into the surrounding pastoral country to add important natural and cultural assets, such as the historic Ord River Station to the east, and to provide better buffering and boundary delimitation.

The existing park boundaries are not ideal, being mainly water courses rather than watershed boundaries. This potentially allows incursion of undesirable impacts from neighbouring areas in catchments upstream of the park, such as waste effluent from mining activities. Regional environmental and land use regulations, and Australia's *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act), appear to be capable of minimising these impacts. As fencing of the property is not feasible, there is an on-going problem in controlling wandering stock and other pests that relies heavily on co-operation of neighbouring landowners. The forthcoming renewal of pastoral leases in 2015 presents an opportunity to add pastoral lands to the park or buffer zones. Leaseholders and the Hall's Creek Shire authorities are sympathetic to this, and the park authorities should undertake surveys and planning, and complete the land transfer negotiations, as soon as possible.

There are no permanent inhabitants in the PNP. Seasonal occupation of special Living Lease Areas by traditional owners is commencing and will expand in the future.

4.2. Management

The nominated property is public land with strong legal security of protection. PNP and the adjacent PCR are owned and administered by the State Government of Western Australia under the 1984 Conservation and Land Management Act. Legally the nominated property is a Class A Reserve for the purpose of national park, vested in the Conservation Commission of Western Australia. The legally complex and highly litigious issues surrounding native title to land and joint management are evolving rapidly. Despite a recent ruling effectively extinguishing native title to land comprising PNP, the State Government has signaled an intention to amend the legislation in order to secure traditional ownership of land and establish full joint management arrangements under a Park Council representative of traditional owners and the Department of Conservation and Land Management. Living Area leases in the park for some traditional owners have recently been signed with the Purnululu Aboriginal Corporation (an incorporation giving legal identity to indigenous communities and eligibility to receive government funds). The authorities intend to establish more of these leases and extend the same ownership and management arrangements to the adjacent conservation reserve. The Purnululu traditional owners actively support the World Heritage nomination for the park. Recent correspondence from the State Party (letter dated 13 February 2003) advises that a Deed of Agreement has been signed between the Western Australian Minister for the Environment and Heritage and the Purnululu Aboriginal Corporation. The Deed relates to the involvement of the Purnululu Aboriginal Corporation in the management of the Park and brings forward the introduction of effective joint management arrangements.

Federal legislation also applies in the case of Australian World Heritage properties. The EPBC Act, parts of which apply immediately upon nomination, can prohibit actions having significant impact on World Heritage values, and has oversight of management plan preparation and implementation. A legally binding management plan exists for the nominated property, and is currently undergoing mid-term review, particularly to improve the provisions for management of cultural heritage.

Several additional issues require management attention as outlined in the following paragraphs.

4.3. Access, roads and aircraft movements

Land-based public access to PNP is problematic, requiring a three hour drive via a single, privately owned 4WD track that is closed during the four-month wet season. Upgrading the track is required to reduce difficulties and hazards. Negotiations are currently underway with local authorities and pastoral leasees to provide a legally gazetted road. The 50km of internal vehicle tracks in the park are rough and dusty and require sealing. Upgrading is also required

for the seven walking tracks and associated parking areas at the most popular tourist attractions, to improve ease of access, visitor safety and interpretation facilities. Rockfalls, treefall, flooding and heat exposure present varying degrees of risk to visitor safety and require more management intervention. Management of aircraft movements is a significant issue. The majority of day-visitors enter the park by air through a single airstrip and associated helipad, and many others experience the park by aerial overflights. Existing rules relating to flight paths and times appear to be containing problems at current demand levels but, as visitor numbers rise, ensuring public safety and retaining noise levels within tolerable limits will require vigilance, monitoring and research.

4.4 Visitor numbers and impacts

Although visitor numbers have risen steadily in the 15 years since the park was established, they remain low at around 20,000 per year, and are not likely to increase dramatically in the short term, given the remoteness and land access difficulties. The high proportion of aerial access and use keeps environmental and social impacts to a minimum, and the long wet season allows recovery of sites impacted during the short (2-month) peak visitor season. The current management policy of “hardening” existing visitor facilities, with a low-key approach to scale and design standards, should avoid increased impacts. Pressure from tourist operators to open new visitor sites is appropriately resisted at present but it will inevitably increase, and will require care to avoid undesirable impact on natural and cultural values and sites.

4.5 Staffing, funding and facilities

Staffing and funding are barely adequate for current operations and well short of levels required under World Heritage standing. However, the nomination document indicates that there will be a substantial increase in staff and finance if the site is inscribed. The present complement of one ranger-in-charge, an assistant ranger and a (seasonal) visitor centre manager would need to be increased by at least four fully trained rangers plus several maintenance staff, and aboriginal officers to service an expanded cultural heritage management and interpretation programme. Longer-term consideration is also required to supplementing, or replacing, the rudimentary visitor centre and ranger station with an improved facility, preferably sited at the main park access point on the Great Northern Highway. Significant increases would be required to park budgets, which currently rely heavily on revenues from entrance fees and aircraft and tourist safari concessions. Park authorities estimate that upgrading facilities such as staff accommodation would require some AUD \$3 million per year for three years, plus an annual operating grant of about AUD \$400,000.

4.6 Wild animal and pest control

Control of animal pests remains a major park management problem. A principal reason for establishing the park was to halt the effects of vegetation depletion, weed invasion, accelerated soil erosion, and river siltation and flooding due to overgrazing by cattle and feral animals. Removal of some 25,000 cattle and 4,000 donkeys since 1985 has made improvements, and a monitoring and assessment programme is underway. However, stock from neighbouring pastoral stations still gain access, with consequent impacts on boundary riverbeds and riparian vegetation, and on water quality especially at waterholes in the dry season. In the absence of fences, regular mustering and removal of animals are required and there are provisions for prosecuting owners of straying cattle and for the destruction of unbranded stock. The park boundaries need to be re-set to include a substantial buffer into pastoral leases on all sides of the park, particularly in the south and east to better protect the Ord River. More effort is required to the limited amount of weed control and mechanical treatment of soil, to promote regeneration of native grasses and shrubs. Native birds,

mammals and reptiles are directly impacted by feral cats, and current research and control plans must be resolutely continued to minimise this threat.

4.7 Mining

Mineral exploration and mining are prohibited in the PNP, but operations in neighbouring catchments create potential problems. In the PCR, abutting the park, current prospecting (mainly for copper) indicates the absence of economic deposits. However, unless strictly controlled, waste water from mining the Panton deposit (mainly platinum) in the Ord River catchment upstream from the park could affect water quality in the park. The nomination document also notes that the *Mining Act of Western Australia* provides for the excision of conservation areas for mining with agreement of both Houses of Parliament, and the nomination document notes that this has happened five times in 10 years.

However, existing Commonwealth legislation appears adequate to prevent serious impacts from occurring, through provisions of the EPBC Act which can over-ride State legislation and invoke review by Commonwealth ministers and a Commonwealth-initiated environmental impact assessment process where World Heritage values are threatened. This has been confirmed in a letter to IUCN from the State Party subsequent to the field inspection. The State Party also advises that the application of the EPBC Act to areas outside the boundaries of the World Heritage property “obviates the need to establish formal buffer zones around the entire boundary of each of Australia’s World Heritage properties” (letter dated 13 February 2003).

4.8 Fire management

Fire is a natural phenomenon in the Purnululu landscape and a major management issue of regional importance. Prolific vegetation regrowth following removal of grazing pressure, coupled with the demise of aboriginal patch burning, has increased the incidence and destructive influence of large-scale wildfires (a major wildfire in September 2002 burned some 100,000ha, including half the area of the Bungle Bungle range, resulting in the temporary closure of the park to visitors). The current review of fire management to replace fire reduction policies with a strategic fire protection programme, including traditional patch burning, is commendable and should be implemented.

5. ADDITIONAL COMMENTS

Aboriginal Australians have occupied the Ord River region for some 40,000 years, concentrating along rivers and gorges affording permanent food and water resources. Rock shelters beneath cliffs were other important living areas for people moving seasonally between the plains and uplands. This is a hunter-gatherer culture, with two main tribal groupings and their economic networks, and four main languages, mixing in the area. The people, referred to as traditional owners, have a strong attachment to land and natural resources, expressed through religious philosophy (Narrangkarni or “the Law”); the use of shared names linking individuals to geographical features (narraku), a detailed system of ecological knowledge and use of plants and animals; and the material evidence from hundreds of archaeological sites including rock art sites, stone quarries, burial sites and artefact scatter. Attachment to land has enabled the aboriginal people to survive the impact of colonisation by pastoralists.

The Kimberley region was one of the last parts of Australia occupied by non-aborigines who began arriving in the mid-1880s, taking up 50,000 to 300,000 ha leases on native lands. To retain connection to their land the aborigines became a pastoral labour force, and by the beginning of the 20th century there were some 50,000 head of cattle on the Ord River

grasslands. The influx of miners following the 1885 Hall's Creek gold rush brought profound social changes with the introduction of diseases and violence, and destruction of traditionally occupied land through overgrazing and soil and river erosion. Cultural dispossession continued when aborigines were compelled to leave the cattle stations from 1968 and settle in camps on the fringes of towns.

PNP no longer exhibits traditional settlement and use. There has been serious disruption and dislocation of the aborigine community, and some reduction in their knowledge of the land. However, clear evidence of a continuing association with their native country is manifest in:

- Schooling of young people in language and traditional knowledge.
- Community-initiated surveys of archaeological and cultural resources, and associated mapping and database development.
- Negotiation of living lease areas in the park for seasonal occupation.

The new joint management arrangements, guided by the Purnululu Aboriginal Corporation, will provide for an improved cultural management programme staffed by traditional owners, and negotiated agreements for continuance of extraction and use of natural resources. In turn, improved cultural heritage management will contribute to enhanced biodiversity protection.

6. APPLICATION OF WORLD HERITAGE CRITERIA

PNP has been nominated under natural criteria (i), (ii) and (iii).

Criterion (i) Earth's history and geological features

The claim to outstanding universal geological value is made for the Bungle Bungle Range. The Bungle Bungles are, by far, the most outstanding example of cone karst in sandstones anywhere in the world and owe their existence and uniqueness to several interacting geological, biological, erosional and climatic phenomena.

The sandstone karst of PNP is of great scientific importance in demonstrating so clearly the process of cone karst formation on sandstone - a phenomenon recognised by geomorphologists only over the past 25 years and still incompletely understood, despite recently renewed interest and research. The Bungle Bungle Ranges of PNP also display to an exceptional degree evidence of geomorphic processes of dissolution, weathering and erosion in the evolution of landforms under a savannah climatic regime within an ancient, stable sedimentary landscape. IUCN considers that the nominated site meets this criterion.

Criterion (ii): Ecological processes

The outstanding biodiversity value of PNP is claimed on three principal grounds: representation of the diversity of Australian biota, an unusual combination of tropical and desert biota, and evidence of adaptation and evolution in Australian biota. The Purnululu region contains an interesting representation of biota within the transition zone between northern (monsoonal) and central (arid) biogeographical realms of Australia.

However, with the incompleteness of biological surveys in PNP (especially for reptiles and invertebrates) and the absence of any rigorous national or international comparative analysis, the overall significance of PNP species and ecosystems is difficult to determine. Rather than outstanding, the biota appear to be no more than typical and representative of a broad zonal biogeographical transition between arid and monsoonal Australia extending continent wide.

Many of the key elements of this are likely to be also protected in existing World Heritage sites such as Kakadu National Park and Uluru-Kata Tjuta National Park. The claim to outstanding universal biological value cannot, therefore, be substantiated at this time. IUCN does not consider that the nominated site meets this criterion.

Criterion (iii): Superlative natural phenomena or natural beauty and aesthetic importance

Although PNP has been widely known in Australia only during the past 20 years and it remains relatively inaccessible, it has become recognised internationally for its exceptional natural beauty. The prime scenic attraction is the extraordinary array of banded, beehive-shaped cone towers comprising the Bungle Bungle Range. These have become emblematic of the park and are internationally renowned among Australia's natural attractions. The dramatically sculptured structures, unrivalled in their scale, extent, grandeur and diversity of forms anywhere in the world, undergo remarkable seasonal variation in appearance, including striking colour transition following rain. The intricate maze of towers is accentuated by sinuous, narrow, sheer-sided gorges lined with majestic *Livistona* fan palms. These and the soaring cliffs up to 250 m high are cut by seasonal waterfalls and pools, creating the major tourist attractions in the park, with evocative names such as Echidna Chasm, and Frog Hole, Piccaninny and Cathedral Gorges. The diversity of landforms and ecosystems elsewhere in the park are representative of the larger region, and lack a unique aesthetic quality, but provide a sympathetic visual buffer for the massif.

The powerful aesthetic experience of the Bungle Bungles has aroused huge interest among the public, and the ranges figure prominently in national and international advertising of Australia's tourist attractions, matching the prominence of the Uluru-Kata Tjuta National Park. Photographers and travel writers include the Bungle Bungles among the world's natural wonders, some describing them as Australia's equivalent of the Grand Canyon. IUCN considers that the nominated site meets this criterion.

7. RECOMMENDATIONS

IUCN recommends that the Committee **inscribe** Purnululu National Park on the World Heritage List under natural criteria (i) and (iii).

Furthermore, IUCN recommends that the Committee request the State Party:

- i. to ensure that any mining activities outside or adjacent to the World Heritage site, including within catchments that flow into the World Heritage site, would be subject to the application of the *Environmental Protection and Biodiversity Conservation Act* and the highest standards of environmental assessment, planning, management and monitoring;
- ii. to give priority to incorporating the Purnululu Conservation Reserve into the park and expanding the park into the surrounding pastoral country to add important natural and cultural assets, and to provide better buffering and boundary delimitation;
- iii. to significantly increase funding and staffing for the site, in order to improve natural and cultural heritage management; to minimize the impacts of grazing animals and invasive species; to upgrade staff and visitor facilities; and to continue negotiations that will lead to improved access to the park, while taking great care to avoid undesirable impacts from increased visitation on the natural and cultural values of the site; and
- iv. to provide a detailed report on progress with these issues in two years time.