

Profiles

Photo by Andreas Wistuba



Gunung Mulu NATIONAL PARK SARAWAK, BORNEO, MALAYSIA

Gunung Mulu, the second highest mountain in Sarawak, is a very important national park because of its high biodiversity and its tropical karsts, the most studied in the world. It is also fast becoming famous for its gigantic limestone caves where millions of swiftlets and bats roost. One of Malaysia's World Heritage Sites, Gunung Mulu National Park was first constituted on 3 October 1974, and opened to the public in 1985 (www.unesco.org).

Gunung Mulu in Sarawak, Borneo and Mt. Kinabalu in Sabah, both ASEAN Heritage Parks of Malaysia, are not more than 300 km apart but have vastly different features. Mt. Kinabalu is one massive granite mountain rising sharply to some 4,100 metres while Gunung Mulu is characterised by varied geological formations dominated by a large sandstone mountain – the 2,376-meter high Gunung Mulu, and two smaller limestone mountains: Gunung Api (1710 metres) and

Benarat (1615 metres).

The 52,866-ha (544 sq. km.) National Park lies astride the watershed between the Sungai Tutuh, which marks the park's southern boundary and the Sungai Medalam in the north (ASEAN/JICA/UNEP, *undated*). It is contiguous to the Medalam Protected Forest.

Its steep ridges and escarpments, and karst phenomenon are among the most interesting land types in the ASEAN region. The Park boasts of limestone pinnacles, caves, towers, terraces and floodplains, and diverse plant and animal life. Both Gunung Mulu and Kinabalu encompass almost all the land ecosystem types found in Borneo.

The Limestone Caves

The limestone caves of Gunung Mulu set it apart from the other parks across the region, and reportedly, are what could make the Park world famous (ASEAN/JICA/UNEP, *undated*). There are 19 major

caves and over 89 kilometres of huge cave passages (Brook, D.V. *et al.* 1982).

The most spectacular is Gua Payau or Deer Cave (*Gua*, means cave; *Payau*, deer), which is known as the world's largest natural cave passage, measuring 120 to 150 metres in diameter. Sarawak Chamber in the southeastern part of Gunung Api is the world's largest natural chamber within a cave (Gua Nasib Bagus – Good Luck Cave). Accordingly, the chamber, which measures 600 m long, 400 m wide and 270 m high (from the lowest part of the floor to the highest ceiling), can accommodate eight Boeing 747 aircrafts lined up nose to tail. On record, the 108-km long Clearwater Cave System is the longest in Asia, and believed to be the 11th longest cave system in the world. Clearwater Cave contains the largest examples of photo-kast in the world and also the largest windblown stalactite, known to be over one meter in length. Stromatolites are also common at all the cave entrances (www.unesco.org).

Accordingly, the most beautiful is Gua Ajaib (Wonder Cave), which is adorned with all shapes and sizes of calcite formations such as fans and delicate halictites (ASEAN/JICA/UNEP, *undated*).

The Limestone Mountains and Vegetation Zones

A row of limestone mountains right across the middle of the park separates the Mulu highlands in the southeast from the Melinau-Mentawai plains in the northwest. The limestones culminate in the spectacular mountains of Gunung Api and Gunung Benarat. Their most interesting features are the limestone pinnacles, caves and underground streams (ASEAN/JICA/UNEP, *undated*).

Because of its wide range of soil types and altitudes, Gunung Mulu has diverse vegetation formations. Some 17 vegetation zones have been recognised, over 3,500 plant species listed, and 2,000 flowering plants identified. The World Wildlife Fund and the International Union for the Conservation of Nature has considered Gunung Mulu a Centre of Plant Diversity (1994-1995).

(www.unesco.org).

As cited in the book ASEAN Heritage Parks and Reserves (1992), J.A.R. Anderson and Paul Chai (1984), Sarawak's experts on vegetation, identified four main formations comprising a total of 14 forest types. On the Gunung Mulu Massive, multi-storied mixed lowland dipterocarp forest occurs up to an altitude of 800 metres. It is one of the most diverse in Malaysia; over 284 tree species have been recorded in a 1.2 hectare area only. The dominant dipterocarp genera are *Shorea* and *Dryobalanops*; others include *Durio*, *Diospyros*, *Calophyllum*, *Garcinia*, *Syzygium* and *Artocarpus* (ASEAN/JICA/UNEP, *undated*); (www.unesco.org)

The lower montane forest ranges from 800 to 1,200 meters where the trees are smaller, the *Dipterocarpaceae* begin to lose their dominance and the oaks and myrtles become more abundant. The ground herbs also start to increase in number.

In the upper montane forest that extends from the 1200-meter level to the summit of Mulu, three types are recognized at different elevations, differing in structure and height, and in the frequency of montane flowering plant families. Bryophytes and lichens are common. At the lower levels, oaks and chestnuts predominate, but *Podocarpaceae*, *Myrtaceae* and *Guttiferae* replace them at higher levels. Closer to the summit, the *Ericaceae* and *Nepenthaceae* are prominent.

On the other hand, the limestone forest is very variable and distinct from the lowland rainforest or sandstones or other



Deer Cave

Photo by Sarawak Biodiversity Center

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rock types. On boulder-strewn scree slopes, the limestone forest is open and the species found are *Azadirachta excelsa*, *Sindora coriacea* and *Scorodocarpus borneensis*. On limestone slopes, the forest ranges from low dense associations of small shrubs and treelets on steep slopes to high forest. On more gentle slopes, the dipterocarps include *Hopea* and *Shorea* species.

The steep limestone cliffs have a different type of flora such as *Monophyllaea*, *Cyrtandra* and *Boea*, which have high ornamental value.

On limestone mountains, the vegetation has been classified into two altitudinal belts. The lower montane limestone forest ranges from 800 to 1200 metres, where the only dipterocarp species recorded is *Hopea argentea*, and the rest are non-calcicolous species such as *Parishia maingayi*, *Tristania obovata*, *Canthium*, and *Palaquium*. In the upper montane forest, from 1200 to the summit, conifers like *Dacrydium* and *Phyllocladus* are common. Other conspicuous plants include three *Rhododendron* species, three *Pandanus* species, the pitcher plant *Nepenthes*, and the genus *Leptospermum*.

Northwest of the limestone massifs, the vegetation of the alluvial plains is perhaps the most variable, largely because the soils in the flood plain are from varied sources. Common species include *Eusideroxylon malagangai*, *Parashorea macrophylla*, and species of *Pometia*, *Octomeles*, *Dracontomelon* and *Pterospermum*. Ground flora and climbers

are abundant on the forest floor while epiphytes are common in the high forest. *E. malagangai* is the famous Bornean ironwood that produces the much sought after Belian wood.

The *kerangas* forest, found on the terraces of the plains, is mainly composed of small trees with straight stems like *Shorea albida*. Other species include *Melanorrhoea macrocarpa*, two species of *Calophyllum*, *Cotylelobium burkii*, *Shorea scabrida*, and two species of *Nepenthes*: *N. bicalcarata* and *N. rafflesiana*.

Northwest of the park, the Setup Shales support another type of vegetation that is closely allied to the lowland dipterocarp forest of the Mulu massif. It is a closed mixed dipterocarp forest, dominated by four species of *Shorea*, *Drybalanops beccarii* and *Parashorea smythiesii*.

Gunung Mulu is also known to be one of the richest sites in the world for palms; approximately 111 species and 20 genera have been recorded. The wild sago palm (*Eugeissonia utilis*) that occurs on the steep slopes of Gunung Mulu, *Iguanura melinauensis* and *Licuala lanata* are endemic to the alluvial plain; *Calamus neilsonii* and *Salacca rupicola* are endemic to the limestone and *Areca abdulrahmanii* on the Setap shales.

Over 1,700 species of liverworts and mosses have been recorded. Mosses endemic to the park include *Stereodontopsis flagellifera*, *Coryphopteria andersonii*, *Hypnodendron beccarii* and *H. vitiense*. The very rare bog moss (*Sphagnum perichaetiale*) can be found in rain gullies in the high forest. There are also a great number of spore-producing plants like Pteridophytes. Some 442 species, many of them ferns, have been identified while 4,000 species of fungi have been recorded.

Medicinal plants should not be ignored: 40 species have been recorded as having been used by the Penan for various ailments.

The Animal Life

A yearlong expedition organised by the Sarawak Forest Department has fully investigated the park's fauna. The faunal species recorded include 67 mammalian



species, 262 bird species, 20,000 species of invertebrates, 25 snakes species and 23 lizards species, 75 species of amphibians and 320 species of fish. This is only a small portion of the total number of estimated species (ASEAN/JICA/UNEP, undated).

Except for the orangutan, the Sumatran rhinoceros and banteng, which are thought to have been hunted out, most of the mammals expected to be there are present. These include four species of monkeys, the western tarsier, slow loris, Bornean gibbon, the sambar deer, barking deer, bearded pig, and carnivores like the Malayan sun bear and civets. But these occur in much lower numbers than expected and the present low density of populations is attributed to hunting. The other important mammal species identified include the Malayan Pangolin (*Manis javanica*), 28 species of bats, two species of endemic Borneo squirrels, the tufted ground (*Rheithrosciurus macrotis*) and the plain pigmy (*Exilisciurus exilis*). The smallest mammal in the world, Savi' pigmy shrew (*Suncus etruscus*), weighing only two grams is found there.

Deer Cave harbors one of the world's largest colonies of free tailed bats, the Wrinkle-lipped bat (*Tadarida Chaerephon plicata*), numbering some three million. It also houses the largest number of different bat species in any cave; 27 bat species are known from Mulu, 20 of which have roosts in the caves. The Lesser Tailless Round Leaf bat is found in the park and have not been seen anywhere else in Borneo; the Orange Tube-nosed bat is a new record for Borneo in the 1977/1978 Expedition (Hazebroek Hans P. & Abang Kashim b. Abang Morshidi, 2000).

Many of the cave fauna species are endemic, with 41 on the endangered species list. The major caves also house swiftlets, mainly Mossy-nest swiftlets (*Collocalia salagna*). Edible nest swiftlets are found in small numbers only.

Of the bird species, all 8 hornbill species known in Borneo have been recorded in the Park such as the Wrinkled Hornbill (*Aceros corrugatus*). The other bird species include sunbirds, flycatchers,



Nepenthes lowii

Photo by Andreas Wistuba

bulbuls, and babblers. The montane forest forms the Bornean Mountain Endemic Area with 24 endemic species, including the Mountain Serpent Eagle which is under the CITES Threatened Species List. Other endemic species include the Bulwer's Pheasant (*Lophura bulweri*), Storm's stork (*Ciconia stormi*), and the Dusky Murnia (*Lonchura fuscans*).

A total of 25 snake species, 23 lizards, 74 frogs and toads including Wallace's Flying frog (*Rhacophorus nigropalmatus*), and 320 species of freshwater fishes have been recorded. The list includes the regal Reticulate python (*Python reticulatus*), and the Reed snakes - *Calamaria borneensis* and *C. melanota*. Poisonous snakes include the Banded-coral snake (*Maticora intestinalis*), the Yellow-headed Krait (*Bungarus flaviceps*) and the Spotted Cat snake (*Boigo drapiezii*). A most significant frog species is the Bush frog (*Philautus* spp.) that has been observed to lay eggs in the fluid of the pitcher plant. Twenty-three lizard species have likewise been identified.

The Climate

The most significant aspect of the park's climate is the rainfall, which Mulu is abundant with. Though there is no distinct dry season, there is some seasonal precipitation. There appears to be two distinct maxima: the October-November period and the April-May period. Some areas also receive high rainfall in January at the height of the northeast monsoon. The southwest monsoon from August to September, which brings torrential rain to many parts of Southeast Asia, loses most of its

moisture by the time it reaches Mulu, and the months of August and September are known to be significantly less rainy (ASEAN/JICA/UNEP, *undated*).

Mean and maximum temperatures in the Melinau lowlands range from 23°C to 26° C and at Gunung Mulu, from 14°C to 18°C (www.unesco.org).

The park also experiences occasional heavy downpour. These heavy storms often cause the upper reaches of the rivers to rise very rapidly; Sungai Melinau has been known to rise 10 to 30 feet overnight.

Accordingly, the more than abundant supply of tropical rainfall with its high erosive power has worked wonders on the rocks of the park. It has also formed a very extensive network of rivers and tributaries that has shaped parts of the limestone hills into impressive pinnacles, cut deep gorges and dug enormous caves in the karst area of the park.

The Indigenous People and Their Culture

The Penan people are found as semi-settled and nomadic groups along the borders of the park and on its boundaries. Two long houses exist along the southwestern perimeter of the park at Batu Bungan and Long Iman, where a number of Penan are settled. A nomadic group of this tribe lives in the eastern part of the park (www.unesco.org).

The Penan and Berawan indigenous peoples who live adjacent to the park boundary have hunting and collecting privileges in subsistence hunting zones within the park (www.unesco.org). Archaeological excavations from the Cave of the Winds by the Sarawak Museum in 1989 have revealed artifacts and human remains believed to date from 1500 to 3000 years (Hazebroek Hans P. & Abang Kashim b. Abang Morshidi, 2000). The cave may have been an ancient burial site, and many of the artifacts are identical to those found at similar sites in the region (www.unesco.org).

Park Management

The State Forestry Department has overall control of the National Park. The Director of Forests administers it through

the National Parks and Wildlife Division, which delegates the management of the park to the Sectional Forest Officer at Miri. The Park Headquarters is located on the left bank of the Melinau River. All visitors are required to obtain a permit to enter the Park, and must be accompanied by a Park guide.

High and low density, traditional use and wilderness zones have been created in the park. High-density zones are concentrated around the Park Headquarters, and eight caves, four of which are show caves. Visitors are restricted to paths. Rules governing visitor behaviour are strictly imposed to minimise disturbance to the caves and their fauna. Traditional zones are for subsistence hunting and gathering of forest produce. Wilderness zones include 95% of the caves. The general public is not allowed access to these zones, and research is only allowed with permission from the Director of Forests.

Three extensions to the National Park have been proposed. These include the Medalam extension to the north that would constitute a new national park covering 6,235 ha (Gunung Buda National Park). The proposed Ubung extension on the eastern boundary of the Park covers 16,177 ha and protects the Tutuh River. The Lutut extension is proposed on the western boundary of Gunung Mulu, and will protect the Lutut River, a tributary of the Melinau River. These areas have been proposed as the Park's buffer zones (www.unesco.org).

Access Routes to the Park

Gunung Mulu is the least accessible of the three ASEAN Heritage Parks of Malaysia. It is accessible by boat along the Baram and Tutuh Rivers or by air from Miri, Limbang and Brunei Darussalam. There are also two long and rather difficult riverine routes. The main route, opened by the Forest Department in 1961, enters the park from the southwest via the Baram River and its tributary, the Tutun River, and would take a day's travel; from there to the park headquarters at Long Pala would take almost the whole morning of the next day. If the water is low, which is frequent, the second part of

the journey could take a whole day. Marudi is connected to the outside world by air via Miri and the state capital of Kuching.

The other route enters the park on its northern boundary, following the Limbang and the Medalam Rivers. From a point on the Medalam River, west of Gunung Buda, a trail used by the Penan that runs southerly and west of Gunung Benarat to the Melinau Gorge leads to the park.

Caving or Cave Tours

Four caves (Deer Cave, Lang's Cave, Wind Cave and Clearwater Cave) have been developed for visitors with cement, timber walkways and electric lighting. In addition, seven wild cave trails are open to visitors for adventure caving activities. An extensive number of hiking trails totaling 37.9 kilometres have also been developed. Restrictions on activities are imposed. Group size is limited to 10 people for the show caves, visiting at 20-minute intervals.

Low-density zones include the trails and caves open for adventure caving activities. Six persons in a group and one guide are allowed in these areas. The total carrying capacity for the zones is restricted to 60 people per day.

Visitor Facilities

The Sarawak Forest Department provides good accommodation in VIP rest houses, chalets and a hostel at reasonable prices, and the washroom facilities are also within the Park Headquarters. Tour agencies can make arrangements for the use of these facilities. The Park Headquarters also has a canteen that serves simple meals (Hazebroek Hans P. & Abang Kashim b. Abang Morshidi, 2000).

In addition, several tour agencies run their own lodges, located along the Melinau River, which normally takes less than a 10-minute boat ride to reach from the Park Headquarters. These agencies generally provide basic but clean accommodation, and also transport to the park and lead tours within the park.

Other accommodations include The Royal Mulu Resort, a five-star hotel located on the banks of Melinau River,



Photo by Andreas Wistuba

***Nepenthes muluensis*, one among many pitcher plant species in Mulu National Park**

which takes about 10 minutes by boat or bus to reach from the Park Headquarters. The Royal Mulu Resort also organises guided tours to the Park

Visitor facilities here include an interpretation centre, an audio-visual room, visitor registration building, and washroom. Additional facilities are located in the park. ■

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