Gunung Mulu National Park

2020 Conservation Outlook Assessment

SITE INFORMATION

Country: Malaysia
Inscribed in: 2000
Criteria: (vii) (viii) (ix) (x)

Important both for its high biodiversity and for its karst features, Gunung Mulu National Park, on the island of Borneo in the State of Sarawak, is the most studied tropical karst area in the world. The 52,864-ha park contains seventeen vegetation zones, exhibiting some 3,500 species of vascular plants. Its palm species are exceptionally rich, with 109 species in twenty genera noted. The park is dominated by Gunung Mulu, a 2,377 m-high sandstone pinnacle. At least 295 km of explored caves provide a spectacular sight and are home to millions of cave swiftlets and bats. The Sarawak Chamber, 600 m by 415 m and 80 m high, is the largest known cave chamber in the world. © UNESCO

SUMMARY

2020 Conservation Outlook
Finalised on 02 Dec 2020
GOOD WITH SOME CONCERNS

Gunung Mulu is an extraordinary World Heritage site, combining some of the world's most impressive caves with great tracts of primeval tropical rainforest. Its Outstanding Universal Value is protected by a combination of the site's remoteness (no public road access to the inside of the park), rugged terrain, legislative basis of protection, an Integrated Development and Management Plan, professional management, international research projects, and the existence of a valuable tourism industry. Concerns for the site arise largely from external factors - intensive development up to part of the park's boundary facilitating unauthorised access and small-scale exploitation; the prevalence of forest fires in Sarawak; and the onset of climate change.
FULL ASSESSMENT

Description of values

Values

World Heritage values

► Spectacular caves  
Criterion:(vii)

Sarawak Chamber, one of the largest cave chambers in the world, stretches 600 m in length by 415 m wide and 80 m high. Deer Cave at 120 to 150 m in diameter is the largest cave passage in the world known at the time of inscription and the Clearwater Cave System holds the world record as the longest cave in Asia at 110 km of mapped and explored passages (238 km as of 2020). The caves contain fine examples of tropical river caves, flood incuts, vadose, and phreatic caves, exhibiting fine examples of all types of speleothems (structures formed in a cave by the deposition of minerals from water) (World Heritage Committee, 2012).

► Exceptional natural beauty and an outstanding wildlife spectacle  
Criterion:(vii)

Gunung Mulu National Park is an area of exceptional natural beauty, with striking primary forest, karst terrain, mountains, waterfalls and some of the largest caves on earth (World Heritage Committee, 2012). The daily exit en masse of millions of bats and swiftlets from Deer Cave is an outstanding natural phenomenon; a superlative wildlife spectacle and likely the most outstanding readily accessible example of its kind. Visitors to the park view the phenomenon daily.

► Outstanding example of cave geomorphology  
Criterion:(viii)

The park is an outstanding example of major changes in the earth's history. Major uplift that occurred during the late Pliocene to Pleistocene is well represented in the more than 526.7 km (as of 2020) of explored caves as a series of major cave levels. The surface and underground geomorphology and hydrology reveal significant information on the tectonic and climatic evolution of Borneo. The sequence of terrestrial alluvial deposits provides an important record of glacial – interglacial cycles with the series of uplifted caves ranging from 28 m to over 300 m above sea level are at least 2 to 3 million years old, indicating uplift rates of about 19 cm per 1,000 years. This exceptionally long period makes the caves a valuable data source on geo-climatic fluctuations during the Pleistocene (World Heritage Committee, 2012).

► Cave ecology (troglobite and stygobite evolution)  
Criterion:(ix)

The property provides significant scientific opportunities to study theories on the origins of cave fauna with over 200 species recorded, including many troglobitic and troglomorphic species and it displays outstanding examples of ongoing ecological and biological processes. (Mould et al, 2013) Seventeen vegetation zones have been identified along with their diverse associated fauna. Some 3,500 species of plants, 1,700 mosses and liverworts and over 4,000 species of fungi have been recorded within the property. At the time of inscription, there were known to be 20,000 species of invertebrates, 81 species of mammals, 270 species of birds, 55 species of reptiles, 76 species of amphibians and 48 species of fish (World Heritage Committee, 2012). Subsequent studies and research have increased these numbers. The food webs of Mulu's caves and the large-scale transfer of food energy from forest to caves by bats and swiftlets is an exceptionally well-studied process here. Many of Mulu's troglobites underground invertebrates belong to very ancient groups that have largely disappeared from the modern land surface and are now represented by a few widely scattered species.
One of the richest assemblages of flora biota

The property supports one of the richest assemblages of flora biota to be found in any area of comparable size in the world. It is botanically-rich in species and high in endemism, including one of the richest sites in the world for palm species and contains outstanding natural habitats for in-situ conservation for a large number of species. Seventeen vegetation zones have been identified along with their diverse associated fauna. Some 3,500 species of plants, 1,700 mosses and liverworts and over 4,000 species of fungi have been recorded within the property (World Heritage Committee, 2012).

One of the richest assemblages of fauna biota

Deer Cave alone has one of the largest colonies in the world of free tailed bats, Chaerephon plicata at over 3 million. This one cave also has the largest number (12) of different species of bats to be found in a single cave. Several million cave swiftlets (Aerodramus sp.) have been recorded from one cave system, constituting the largest colony in the world. Many species of fauna are endemic and 41 species are included on the endangered species list (World Heritage Committee, 2012).

Assessment information

Threats

Current Threats  Low Threat

Much of the park comprises very rugged terrain; there are no significant roads within the park and none of the park has been subjected to commercial logging. Only a small selection of caves is open to the public and infrastructure is provided for the significant number of tourists that visit the park. Three activities - hunting and adjacent oil-palm and forestry development - are current threats. If the hunting is genuinely restricted to acceptable species (wild pig and common deer) then it is probably sustainable (provided it conforms to levels stipulated in the management plan), though at present (2020) all species are targeted. Illegal hunting does occur. The property has significant interfaces with other land-uses that can bring degradation and undesirable access to its fringes.

Hunting and trapping, Logging/ Wood Harvesting, Fishing / Harvesting Aquatic Resources, Other Biological Resource Use

(Traditional hunting)

Penan, Berawan, Lun Bewang and Iban people from various longhouses all have - and do exercise - hunting privileges within prescribed areas of the park but also hunt beyond the prescribed areas. The species targeted are those without endangered status as prescribed in the Sarawak Government Gazette (1974), such as wild boar (World Heritage Committee, 2012), however, there appears to be no recent confirmation of this. Illegal bird nest (black nest) collection, which might have negative impacts on the cave environments including cave fauna, has also been reported (IUCN Consultation, 2020a). However, overall the scale of this threat is unclear. In the last few years, the price of black nests has gone done, which might have decreased illegal collection. In addition, more and more of the local communities are engaging in “house swiftlet farming” in their villages, and illegal collection might therefore be less rampant (IUCN Consultation, 2020b).

Logging/ Wood Harvesting

(On-going wood production adjacent to park)

Logging occurs in adjacent forests, including the catchment of Tutoh River which forms part of the park boundary. Areas of forest surrounding the property have been heavily cut, with complex road network and logged areas up to the rivers that demark much of the boundary of the property. The access provided to the park's perimeter brings the threat of unauthorised entry and associated illegal hunting and collection of biological resources, an ongoing threat to the property's integrity and natural values.
(World Heritage Committee, 2012). Further discussion of this threat occurs below.

**Crops, Forestry/ Wood production**

*(Forest clearance for oil palm plantation)*

In 2018 forest clearing began in an oil palm plantation concession area along the Tutoh River given to Radiant Lagoon. The concessions (Lots 2 and 3 of Block 0) covers 4,400ha and located 1-2km east of the World Heritage site, and immediately adjacent to Mulu National Park Extension I. A buffer zone of 200m has been proposed between the Mulu National Park Extension I and the plantation. A fact finding mission by a concerned NGO found that by April 2018, 730ha of intact secondary rainforest had been cleared and timber extracted (Bruno Manser Fonds, 2019). In August 2019, local indigenous communities filed a land rights lawsuit against Radiant Lagoon, putting the plantation project on hold. The lease area is understood to be in an important wildlife corridor between the property and the forests of Brunei. The use of pesticides on the plantations would also be a considerable threat to cave swiftlets and bats, which are a key part of the OUV as these species are known to forage for food in a 25-50 km radius of the Deer Cave.

On 15 June 2020, the Ministry of Urban Development and Natural Resource (MUDeNR) informed that YAB Chief Minister of Sarawak agreed that the two pieces of land in Lot 2 of Tutuh Land District and Lot 3 of Apoh Land District adjacent to Gunung Mulu National Park, which were initially intended to be developed for oil palm plantation, are now to be gazetted as extension to Gunung Mulu National Park (IUCN Consultation, 2020b). On 15 – 18 July 2020, Sarawak Forestry Corporation (SFC) had carried out a scoping inspection to these areas. From the inspection, the access road to Land of Lot 2 and Lot 3 were already covered with overgrown vegetation, which indicates that the said areas are already abandoned and all activities had also ceased operation. SFC is now in the midst of preparing a Cabinet Paper, which will be forwarded to MUDeNR for their further action to gazette it as extension area of Gunung Mulu National Park (IUCN Consultation, 2020b). Once confirmed, the threat from forest clearance in these locations is likely to decrease and may be considered low in the future.

**Potential Threats**

**Roads up to the park boundary for whatever purpose (forestry, mining, hydro, oil-palm plantations)** represent a significant potential threat. Increasing numbers of visitors could place pressure on the park’s attractions; the envisaged calculated maximum of tourist arrivals is 30,000 per year. Transparent monitoring and planning arrangements can help give confidence on this front but there is no efficient monitoring in place (as of 2020). The biggest potential threat is from climate change. With forest fires a frequent and intensifying phenomenon throughout South East Asia due to land clearing, including Sarawak, and with potential ignition sources around parts of the property's boundary, the park’s edges may become vulnerable to fire.

**Roads/ Railroads**

*(Potential for expansion of roads to service forestry, mining, hydro development)*

Roads in surrounding areas are potentially an important threat to the park and could arise in the event of new forestry, mining or hydro development projects (see above).

**Tourism/ visitors/ recreation**

*(Potential for increased tourism impacts)*

Changes in the number and type of tourists together with associated development and changes are potential threats. Visitor management is presently in accord with a management plan but if road access were to be developed to the park, a different kind of tourism could be initiated. The major commercial tourism facility associated with the park, a 100-bed 5-star resort, was significantly upgraded in 2012/13 and its management contracted to US based Marriott group in 2013/14. Visitor statistics tabulated by the management agency (Sarawak Forestry Corporate 2020 - see visitor-statistics) indicate a general gradual increase in visitation to the property that should be manageable (visitor numbers have roughly doubled since 2002 - see Periodic Reporting 2002). In 2018 there was actually a slight drop in total visitation to 21,665. There appear to be no current plans for major increases in tourism infrastructure.
The impacts of Covid-19 pandemic has severely affective tourism activities in the park and with almost zero visitors due to closed international borders (IUCN Consultation, 2020b).

**Agricultural effluents**

*Potential for siltation from upstream logging and roading*

Part of the Tutoh River catchment has been subject to logging and may be logged again in the future. The Tutoh River forms the southern boundary of the park so there is potential for siltation and erosion on the park margins.

In 2015, the State Government has announced “no more new timber licences to big companies”, and in 2018 “the Sarawak Government will establish more national parks to conserve the environment and create attractions for tourists”. To date Sarawak has 66 protected areas, with a total area of 867,512 ha of land area and 1,234,726 ha of water body area (IUCN Consultation, 2020b). Thus, the threat of siltation might have decreased in recent years.

**Habitat Shifting/ Alteration, Droughts, Temperature extremes**

*Potential for large-scale forest fires*

Large-scale forest fires in South East Asia have become frequent. Media reports refer to fires that have affected parts of the Gunung Mulu property or which have become widespread in Sarawak (Laeng 2014; Malay Mail 2019; Annuar 2019). An increase in such fires could pose a threat to the property's forests and biodiversity. The fires are localized to the karst areas with resulting loss of vegetation. Re-growth takes hundreds of years due to the thin soil cover.

The park has established in-situ fire-fighting, comprising the local communities, park staff, Borsamulu park management (IUCN Consultation, 2020b).

**Overall assessment of threats**

Thanks to the property's size and ruggedness as well as the remoteness of its main attractions there are only some significant current threats; the annual increase in residents now amounting to 800 and the hunting. However, development around the property's edges combined with the effects of climate change could change this situation quite rapidly. Enforcement of the regulations on hunting is low.

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**Protection and management**

**Assessing Protection and Management**

**Management system**

The Sarawak Forestry Corporation (SFC) is the management agency ultimately responsible for park management and maintenance of OUV in the Gunung Mulu World Heritage property (Sarawak Forestry Corporation 2020). Operational management has been divided between two organizations, but since January 2020, SFC is managing about 90% of the park (the ‘wilderness zone’) and a private company for the tourism zone. SFC is mandated as the management authority of wildlife and totally protected areas management from the Forest Department Sarawak, and is since January 2020 also responsible for the management of the Wilderness Zone and Borsarmulu Park Management Sdn Bhd has been appointed as the Managing Agent for the Tourism Zone with the responsibility to implement the recommendations of the Integrated Development and Management Plan for the Park which affect the Tourism Zone (Borsarmulu Park Management Sdn Bhd 2020). The Property has an Integrated Development Management Plan (2000-2020) but neither of the above agencies' websites provided a link to the plan. It is therefore not possible to evaluate effectiveness. The integrated development and management plan states the requirement of sustainable development in the caves but new structures have been built using timber which is not sustainable causing fungus growth, deterioration of the timber and bacterial growth.
growth.
Prior to taking over the management of Gunung Mulu NP from the Forest Department Sarawak, SFC has
done various surveys on the wildlife population (in 2018). The results of the surveys generally indicate
the strong integrity of the wildlife population. Since taking over as Management Authority for Gunung
Mulu NP, SFC is in the midst of establishing a new Working Committee for Monitoring the management
effectiveness of Borsamulu Park Management Sdn Bhd as our Management Agent (IUCN Consultation,
2020b).

▶ Effectiveness of management system Some Concern

The current management faces challenges in terms of protection of the Outstanding Universal Value of
the park due to hunting pressure and lack of enforcement of the regulations. There is an ongoing strong
interest by international specialists in the further exploration and research of the park that could
represent a de facto monitoring process that could sound the alert on any inappropriate aspects of
management. There is no evidence of this taking place. Management of the site for tourism continues to
be effective (IUCN Consultation 2020). However, in the absence of information pertaining to the
management plan or monitoring it is not possible to form an absolute determination on effectiveness of
the management system. Monitoring systems have not been implemented sufficiently for hunting, cave
environments open to visitors and the 5 year review of the Management Plan. The current Management
Plan expires in 2020.

▶ Boundaries Some Concern

IUCN's evaluation of the nomination said: 'GMNP's limits are not ideal as full catchment protection is
lacking (very important for some of the caves) and the very important caves in the adjacent Gunung
Buda area are not included in the property. Fortunately, the State Government of Sarawak has
recognised these deficiencies. The west extension No 1 was gazetted in 2012 (Sarawak Government
Gazette 2012) of 4,555 ha. The east extension No2 was gazetted in 2011 (Sarawak Government
Gazette 2011) of 28,251 ha. These extensions (expanding the total National Park area to 85,671 ha)
have not been incorporated into the World Heritage property. This compares to the World Heritage
property area of 52,864 ha. The addition of these two extensions to the World Heritage property
through a Significant Boundary Modification should be explored. Furthermore, Gunung Buda was
gazetted as a National Park (Sarawak Government Gazette 2000) of 6,235 ha and the Buda Medalam
extension (Sarawak Government Gazette 2000) of 5,072 ha. With a total protected area of 11,307 ha
and the Gunung Mulu National Park total of 85,671 ha, the property has the potential to cover a revised
area of 96,978 ha. According to SOC 2001, the local community of Gunung Buda National Park withdrew
their support for the park being added to the World Heritage nomination because of an on-going dispute
with the Government about land rights and co-management of Gunung Buda National Park. This was
due to illegal birds nest collecting. This has been clarified (2018) and the local community are in favor of
Gunung Buda becoming a part of the World Heritage property. (Gill, D.W. 2018). Some statements made
in the Periodic Reporting could not be substantiated from other documentation: ‘Although there was no
buffer zone identified at the time of inscription, the property is surrounded by the National Park that
effectively acts as a buffer zone' (Periodic Reporting 2012). There is no definitive evidence that the park
is ‘surrounded by other national parks' (in fact, the published map indicates otherwise), something that
needs to be clarified.

▶ Integration into regional and national planning systems Mostly Effective

It is apparent that the park is not directly integrated into the Malaysia Plan (10th) that is mostly
economy based. There appears to be no overall State plan for Sarawak with most planning instruments
being geographic or theme-focused. The park is relatively remote and lacks any ground transport so is
not integrated into overall development programs. A search on the website of the Government of
Malaysia (the State Party) yielded no entries for the property. The proposed Regional Integrated
Highland Development Master Plan for Upper Baram, Miri Division, Sarawak (AJC 2018) includes Gunung
Mulu and surrounding area.
**Relationships with local people**

In 2001, the WH Committee was informed of a land claim and dispute involving indigenous people in the Gunung Buda National Park adjacent to the World Heritage property. In 2002, the Committee encouraged dialogue between the World Heritage Centre, IUCN, the State Party and indigenous peoples to resolve these issues (CONF 202 21B.15, 26 COM 21B.15). Decisions 33 COM 7B.16 and 34 COM 7B.15 referred to issues with indigenous people brought to the attention of UNESCO by external sources (World Heritage Committee, 2009, 2010). The latter decision noted that the remaining disputes concerned were occurring outside the property and that local people were being involved in management of the property, including staffing. According to one report, some indigenous Penan were forced out of the park when it was established while others are ‘tolerated’ inside the park because they do not practise forms of shifting agriculture damaging to the forest (Salleh & Bettinger 2007). It appears that at least part of the ongoing dispute is a result of a legacy of displacement. Careful consultation with affected people will be required both to respect human rights and to maintain the property’s OUV.

According to Borsarmulu Park Management, indigenous people play a major role in the park and 97% of employees are reported to be locals (Borsarmulu Park Management 2020 - see Park Management, The Team and Meet the Locals).

Like the rest of the totally protected areas, SFC has formed a Special Park Committees for Gunung Mulu NP as required by the National Parks and Nature Reserves Ordinance. This committee comprises mostly the headmen (village chiefs) and other stakeholders adjacent to the park, with the Park Warden as their Chairman. The role of this committee is to assist the Controller of National Parks and Nature Reserves and the park warden in the protection and management of the park, and to promote public appreciation and enjoyment in the park. This forum helps to increase the local community participation in management of the park (IUCN Consultation, 2020b).

**Legal framework**

The National Park Ordinance for Sarawak was first gazetted in 1956, subsequently amended and is now the National Park and Nature Reserves Ordinance of 1998. ‘The setting of policy direction for management of all National Parks and other Protected Areas in Sarawak is the responsibility of the State Government through the National Parks and Nature Reserves Ordinance (1998) and associated Regulations.’ It is also governed by the National Parks and Nature Reserves Regulation 1999 (www.mulupark.com). The Ordinance forms the legal framework for management of Gunung Mulu National Park with the Forestry Department responsible for administration of parks and nature reserves. Since January 2020, Sarawak Forestry Corporation (SFC) is mandated by the State Government as the sole Management Authority of Wildlife and Totally Protected Areas, while the Forest Department is the authority on Forestry matters as stipulated in the Forest Ordinance only (IUCN Consultation, 2020b). An additional part of the legal framework is the Wild Life Protection Ordinance, 1998 (Sarawak Forestry Corporation, 2020).

**Law enforcement**

Numerous examples of raids by the management agency and/or police on illegal logging or wildlife-exploitation activities are reported on the website (Sarawak Forestry Corporation 2020 - see media releases). None of these appeared to be in the Gunung Mulu property but they do constitute evidence of active law enforcement in the region. A report on enforcement in the next state-of-conservation report by the State Party would be useful. Sarawak Forestry Corporation only have four staff stationed at the park at present (June 2020) so a full enforcement of illegal activities is not possible to achieve. Only an acting Park Warden is present in the park.

**Implementation of Committee decisions and recommendations**

The State Party has been fully cooperative with implementation of Committee decisions. The 2010 decision of the Committee welcomed reports from the State Party and was very appreciative of the cooperation of the State Party. However, almost a decade has elapsed since the last formal report and
the last decision by the Committee decision on the property.

**Sustainable use**: Mostly Effective

Given that 90% of the park is zoned and managed as wilderness, use of this part of the park should be sustainable providing there is monitoring of the impacts of traditional hunting and the ongoing but illegal harvesting of bird nests. This sort of illegal exploitation was reported in 2002 (Periodic Reporting). The tourism zone is the area where people come into contact with the property's sensitive cave-systems. Tourism has the potential to be sustainable but clearly that will be elusive unless there is some genuine monitoring and science applied to tourism planning. Given the potential vested interests of the Borsamulu group as both park manager and resort operator, the monitoring would best be undertaken independently. It is noted that the Department of Forestry prepared a report on proposed monitoring in 2008 but no public documentation of adoption and any results could be located. There may be a need to slow or halt the increasing development both in and around the park so that visitor numbers do not reach levels where the visitor experiences are degraded (IUCN Consultation 2017). The steady increase in the community population (2020) amounting to over 800 people is of some concern as only a small proportion have paid work. This increases the illegal hunting pressure on the park.

**Sustainable finance**: Highly Effective

Funding for the protection and management of Gunung Mulu National Park is provided from the annual budget of the Sarawak State Government. Also, fees are levied on visitors to the park and reportedly collected by the Government for application to park management, though there appears to be no public reporting that can verify or quantify this. Given that the same company that owns the Mulu resort manages the tourism part of the park, there is likely to be a strong lobby for government to fund ongoing infrastructure costs and maintenance. Funding from the date of inscription for World Heritage has been adequate as maintenance, salaries and infrastructure development is paid for by the Sarawak State Government.

**Staff capacity, training, and development**: Some Concern

The 2002 periodic report stated that the property did not have adequate staffing, that additional training for existing staff was necessary and that additional funds were needed (Periodic Reporting 2002). Since then personnel in the park has been increased and by 2020, there is understood to be over 100 personnel. It may be that staff numbers and training are adequate for the site's main tourist facilities but that leaves the question of whether the park's long interface with logging zones and oil-palm plantations is being adequately supervised. Staff training opportunities continue to be provided (IUCN Consultation, 2017) and park guide training regularly provided (IUCN Consultation, 2020a).

**Education and interpretation programs**: Highly Effective

The education component at the schools level is undertaken by the Borsamulu Park Management. Education and interpretation tours are an integral part of their tourism management (Borsarmulu Park Management Sdn Bhd 2020 - see Education portal). There is also an information centre at park headquarters. There are many informative publications available on the above website for download (see Plan your Trip/Downloads).

**Tourism and visitation management**: Mostly Effective

Tourism management is contracted to a private company, Borsamulu Park Management, that is responsible for management of tourism within the 10% of park designated as Tourism Zone. The use of guides not trained by the site administration could potentially lead to wrong and misleading information being delivered (IUCN Consultation 2017). Visitation numbers roughly doubled between 2001 (13,618) and 2017 (23,730) according to Periodic Reporting 2002 and Sarawak Forestry Corporation 2020. This should not, by itself, be a concern provided sufficient resources are provided to manage the increased numbers and provided the management agency derives income from such visitation that can be used for park management.
IUCN World Heritage Outlook: https://worldheritageoutlook.iucn.org/
Gunung Mulu National Park - 2020 Conservation Outlook Assessment

**Monitoring**

It is noted that the Department of Forestry prepared a report on proposed monitoring in 2008 and the 2009 SOC refers to the 'Biodiversity Monitoring System' that has been in place 'since 2008' so presumably that monitoring process is underway but to what extent is not clear (SOC 2009). The management authority publishes figures on park visitation but seemingly not much else (Sarawak Forestry Corporation 2020). Examples of seizures and prosecutions pertaining to illegal exploitation throughout Sarawak are published, but there appears to be no quantitative breakdown pertaining to Gunung Mulu. Monitoring systems are highly desirable and there have been no prosecutions for illegal activities.

SFC has created a Sarawak Biodiversity Information System (SBIS) in which all big data on park and wildlife issues will be uploaded and maintained by the Parks & Biodiversity Database Management System Section. This system will help in the process of monitoring all activities in parks, including Gunung Mulu NP (IUCN Consultation, 2020b).

**Research**

There is substantial evidence of numerous surveys and studies. The park website lists many research projects (Borsarmulu Park Management Sdn Bhd 2020 - see Research portal). Additional research projects throughout Sarawak are identified by the main management agency (Sarawak Forestry Corporation 2020 - see the rimba-sarawak portal). The managing agency has conducted some comparative analysis research to establish the impact of traditional hunting and gathering (PR 2009). The caves are continually being explored and mapped and scientific research conducted (Mulu Caves Project 1978/2020). The Sarawak online Research Application System (SORAS) has recently been introduced for research permits to be issued.

**Overall assessment of protection and management**

The division of management responsibilities between the Sarawak Forestry Corporation for the property as a whole and a private agency for the visitors zone seems to be effective. The underlying legal framework is strong and the park receives natural protection from its rugged terrain and the remoteness of most of the caves (no public road access). Boundaries have been improved through extensions and the establishment of the Gunung Buda National Park and the Medalam extension. Relationships with local indigenous peoples require careful consultation and management. The large number of international research projects provide an early-warning system for the property - at least when it comes to the cave systems themselves. When it comes to the property's broader areas of forest, there are concerns about the ability of the management agencies to adequately supervise the property's long interface with local communities, oil-palm development and logging zones, and to prevent the illegal exploitation (generally minor) of park resources that has been reported. Confidence in the management system could be enhanced through publication of the management plan and monitoring data.

**Assessment of the effectiveness of protection and management in addressing threats outside the site**

The Sarawak Forestry Corporation, which has responsibility for the overall management of the park, has extensive responsibilities for forest areas outside the park and is therefore in a position to play an active role in dealing with any activities or proposed developments that might threaten the park from outside. However, concerns have been raised about logging and oil-palm development up to the boundary of the property. In addition, the extensions to the National Park, which are adjacent to the property are important for the long term protection of the OUV. Serious consideration should be given to include these expanded areas and the adjoining Gunung Buda National Park into the World Heritage property in the form of a Significant Boundary Modification.
State and trend of values

Assessing the current state and trend of values

World Heritage values

► Spectacular caves

No documentary evidence of significant deterioration of these values could be found (official documents, internet).

Trend: Stable

► Exceptional natural beauty and an outstanding wildlife spectacle

The daily bat exodus continues to impress visitors and most commentary is very positive (numerous items and websites on the internet). There is a concern about the lack of understanding of the feeding grounds of the major deer cave bat colony - which are outside of the park - and are quite possibly at risk of development.

Trend: Stable

► Outstanding example of cave geomorphology

No documentary evidence of significant deterioration of these values could be found (official documents, internet) and the large number of international research projects functions as an informal early-warning system.

Trend: Stable

► Cave ecology (troglobite and stygobite evolution)

Given the large number of international research projects occurring at Mulu as well and the absence of any negative reports in official documents and on the Internet, as well as the remoteness of these habitats, the situation looks good but could deteriorate. A concern is the unsustainable illegal birds nesting where habitats are damaged due to camping within the caves, litter and species being destroyed under foot.

Trend: Stable

► One of the richest assemblages of flora biota

There continues to be a strong interest by researchers to conduct biodiversity studies in the park, often resulting in additional new species being discovered. None of the literature viewed raises any concern about loss of biodiversity (all official documents plus numerous published research papers on Internet). However, the concerns raised about small-scale illegal exploitation of some of the biological attributes of the park, the onset of climate change, the widespread phenomenon of forest fires in Sarawak, a significant interface between the park and adjacent intensive development (agriculture, oil palms and logging), and a lack of monitoring data combine to raise concerns about the longer-term future of these forests.

Trend: Data Deficient

► One of the richest assemblages of fauna biota

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Summary of the Values

Assessment of the current state and trend of World Heritage values

Gunung Mulu National Park is one of the best protected and appropriately managed protected areas in South East Asia. The property is in very good condition. International research, applying particularly to the caves and their fauna, provides an early-warning system about any deterioration in their state. If small-scale hunting in the property's forests by indigenous people is carried out as appropriate, then the future of the property's wildlife more broadly remains secure - however this is not possible to verify. Intensive development such as oil-palm plantations and logging around parts of the property's periphery bring the potential for undesirable edge effects. This, combined with the prevalence of forest fires in the rest of the region and the onset of climate change, raises concerns about the future of the property's rainforests and associated biodiversity. Similarly, there is a concern about the lack of understanding of the feeding grounds of the major Deer Cave bat colony - which are outside of the park - and possibly at risk of development and degradation. Up-to-date reporting as well as publication of monitoring data and management planning documents can help address these concerns.

Additional information

Benefits

Understanding Benefits

Direct employment,
Tourism-related income,
Provision of jobs

Important local employment is generated by site-based tourism (Borsarmulu Park Management Sdn Bhd 2020).

Legal subsistence hunting of wild game,
Fishing areas and conservation of fish stocks

Indigenous people who have legal rights for traditional hunting (WHC 2012).

Factors negatively affecting provision of this benefit:
- Climate change: Impact level - Low, Trend - Continuing
- Pollution: Impact level - High, Trend - Increasing
- Overexploitation: Impact level - Low, Trend - Continuing
- Habitat change: Impact level - Low

Due to the increase in community population illegal hunting of all species is carried out with little enforcement. The Melinau River is highly polluted (2020) due to affluent and waste being deposited in the river predominantly at Batu Bungan the Penan settlement. There is no waste management system in place so rubbish disposal areas are a health hazard.

Collection of wild plants and mushrooms

Indigenous people who have legal rights for traditional gathering of plant material (WHC 2012).

Factors negatively affecting provision of this benefit:
- Pollution: Impact level - Low
- Overexploitation: Impact level - Low
- Invasive species: Impact level - Low
- Habitat change: Impact level - Low

► Wilderness and iconic features,
Sacred natural sites or landscapes

In a 'shrinking world', the park is valued for its pristine wilderness, both above ground and subterranean (Sarawak Forest Corporation 2020 - see National Parks and Nature Reserves).

Factors negatively affecting provision of this benefit:
- Climate change: Impact level - Low, Trend - Continuing
- Pollution: Impact level - Low
- Overexploitation: Impact level - Low
- Invasive species: Impact level - Low

► Outdoor recreation and tourism,
Natural beauty and scenery

Valued for its tourism resources, especially the accessible caves, wildlife display (bat exodus) and rainforest setting (UNESCO website 2019, Sarawak Forestry Corporation 2020, Borsarmulu Park Management Sdn Bhd 2020, numerous Trip Advisor reviews).

Factors negatively affecting provision of this benefit:
- Climate change: Impact level - Low, Trend - Continuing
- Pollution: Impact level - Low, Trend - Increasing
- Overexploitation: Impact level - Low, Trend - Increasing
- Habitat change: Impact level - Low

Under the present access conditions the impacts are probably sustainable. Fresh water supplies and electricity supplies to the local community are presently in the planning stage. The lack of a waste management system is of concern.

► Importance for research,
Contribution to education

Because of the great diversity and pristine condition of the park - and the extraordinary attributes of the caves - it is valued by many researchers and cave explorers who conduct numerous surveys and research projects in the park (Sarawak Forestry Corporation 2020, Borsarmulu Park Management Sdn Bhd 2020, numerous papers in international journals, Mulu Caves Project 1978 to 2020). The UNESCO website for the Gunung Mulu World Heritage property says that it is the most researched tropical cave-system in the world.

Factors negatively affecting provision of this benefit:
- Overexploitation: Impact level - Low, Trend - Continuing

Permitted research must abide by guidelines for protection of the resource

► Contribution to education

Interpretation materials of a high standard are readily available and there is an education program for school-age students (Borsarmulu Park Management Sdn Bhd 2020).

Not all guides are sufficiently trained

► Soil stabilisation,
Water provision (importance for water quantity and quality)

The property protects major catchments whose rivers flow into settled areas but due to the rising
population of Batu Bungan Penan settlement the pollution of the Melinau River is of concern.

Factors negatively affecting provision of this benefit:
- Climate change: Impact level - Low, Trend - Continuing
- Pollution: Impact level - Moderate, Trend - Increasing
- Habitat change: Impact level - Low, Trend - Increasing

History and tradition,
Wilderness and iconic features,
Sacred natural sites or landscapes,
Sacred or symbolic plants or animals,
Cultural identity and sense of belonging

Indigenous people have access to the property to practice traditional hunting and other customs but this is over exploited.

Factors negatively affecting provision of this benefit:
- Climate change: Impact level - Low, Trend - Continuing
- Pollution: Impact level - High, Trend - Increasing
- Overexploitation: Impact level - High, Trend - Continuing
- Habitat change: Impact level - Low, Trend - Increasing

Summary of benefits

Tourism visitation to the park provides sustainable employment. Tourism is a major economic driver locally providing jobs to the Indigenous community. The property provides a huge setting for research and education in the fields of biology and earth sciences. The awe-inspiring setting provides all visitors with an experience of nature at its grandest and most primeval. The property also provides environmental services in the form of catchment protection.

Projects

Compilation of active conservation projects

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<thead>
<tr>
<th>№</th>
<th>Organization</th>
<th>Brief description of Active Projects</th>
<th>Website</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Carlton University, Canada.</td>
<td>Biogeochemical studies in caves 2007 to present.</td>
<td><a href="https://mulupark.com/education-research/research-volunteering/">https://mulupark.com/education-research/research-volunteering/</a></td>
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<td>2</td>
<td>Claremont Colleges, California, USA</td>
<td>Biogeochemical studies in caves 2007 to present.</td>
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</tr>
<tr>
<td>3</td>
<td>University of Greifswald, Germany</td>
<td>Interactions between bats and pitcher plants 2013 to present.</td>
<td><a href="https://mulupark.com/education-research/research-volunteering/">https://mulupark.com/education-research/research-volunteering/</a></td>
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<td>4</td>
<td>Department of Zoology. Faculty of Resource Science and Technology. Universiti Malaysia Sarawak</td>
<td>Habitat use and activity patterns of insectivorous bats in the lowland riverine forest of Gunung Mulu National Park. Small mammals surveys</td>
<td><a href="https://mulupark.com/education-research/research-volunteering/">https://mulupark.com/education-research/research-volunteering/</a></td>
</tr>
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<td>5</td>
<td>University of Brunei Darussalam</td>
<td>Acoustic and ecological studies of Amphibians 2007 to present.</td>
<td><a href="https://mulupark.com/education-research/research-volunteering/">https://mulupark.com/education-research/research-volunteering/</a></td>
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<td>6</td>
<td>Graduate School of Human &amp; Environmental Studies, Kyoto University, Japan</td>
<td>Re-evaluation of herpetofaunal inventory in Sarawak 2010 to present</td>
<td><a href="https://mulupark.com/education-research/research-volunteering/">https://mulupark.com/education-research/research-volunteering/</a></td>
</tr>
<tr>
<td>7</td>
<td>Georgia Institute of Technology, USA</td>
<td>Stalagmite records of abrupt climate change in the tropical Pacific 2003 to present</td>
<td><a href="https://mulupark.com/education-research/research-volunteering/">https://mulupark.com/education-research/research-volunteering/</a></td>
</tr>
<tr>
<td>8</td>
<td>Department of Botany, Faculty of Resource Science and Technology, Universiti Malaysia Sarawak</td>
<td>Pollination guilds of aroids at Mulu National Park 2017 to present</td>
<td><a href="https://mulupark.com/education-research/research-volunteering/">https://mulupark.com/education-research/research-volunteering/</a></td>
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<td>9</td>
<td>Universiti Sarawak Malaysia</td>
<td>Fish and Macroinvertebrate communities in selected protected areas in Sarawak 2017 to present</td>
<td><a href="https://mulupark.com/education-research/research-volunteering/">https://mulupark.com/education-research/research-volunteering/</a></td>
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<tr>
<td>10</td>
<td>Universiti Sarawak Malaysia</td>
<td>Herpetofaunal inventory and larval forms 2006 to present</td>
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# REFERENCES

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<tbody>
<tr>
<td>5</td>
<td>Bruno Manser Fonds 2019, The Mulu Land Grab - Results of a Fact-Finding Mission to Sarawak (Malaysia) on palm oil-related deforestation and a land conflict near the UNESCO-protected Gunung Mulu World Heritage Site, Switzerland, &lt;www.bmf.ch&gt;;</td>
</tr>
<tr>
<td>6</td>
<td>Davidson, D, 2019, Buffer zone between plantation and national park to be widened to 1km [online], The Malaysian Insight, viewed 1 January 2020, <a href="https://www.themalaysianinsight.com/s/151695">https://www.themalaysianinsight.com/s/151695</a>;</td>
</tr>
<tr>
<td>7</td>
<td>Donald A. Mcfarlane, Joyce Lundberg and Keith Christenson (2009) An undescribed gecko (Gekkonidae: Cyrtodactylus) from Deer cave, Gunung Mulu national Park, Sarawak, with comments on the distribution of Bornean cave geckos Herpetological bulletin [2009] - Number 110</td>
</tr>
<tr>
<td>14</td>
<td>Laeng, J 2014, Fire destroys 40ha of forest at Mulu National Park [online], The Borneo Post, viewed 1 January 2010, &lt;<a href="https://www.theborneopost.com/2014/08/12/fire-destroys-40ha">https://www.theborneopost.com/2014/08/12/fire-destroys-40ha</a>...;</td>
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<tr>
<td>22</td>
<td>Periodic Reporting (2002) Gunung Mulu National Park</td>
</tr>
<tr>
<td>23</td>
<td>Periodic Reporting (2012) Gunung Mulu National Park</td>
</tr>
<tr>
<td>24</td>
<td>Rainforest Rescue 2019, UNESCO World Heritage: tell the palm oil barons to back off! [online], <a href="https://www.rainforest-rescue.org/petitions/1171/unesco-wor...;">https://www.rainforest-rescue.org/petitions/1171/unesco-wor...;</a></td>
</tr>
<tr>
<td>25</td>
<td>Research and Markets (2013) SEB - Tutoh Hydro Electric Power Plant Sarawak <a href="http://www.researchandmarkets.com/reports/2319373/seb_tutoh">http://www.researchandmarkets.com/reports/2319373/seb_tutoh</a>...</td>
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