

IUCN Conservation Outlook Assessment 2014 **(archived)**

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Please note: this is an archived Conservation Outlook Assessment for Tsingy de Bemaraha Strict Nature Reserve. To access the most up-to-date Conservation Outlook Assessment for this site, please visit <https://www.worldheritageoutlook.iucn.org>.

Tsingy de Bemaraha Strict Nature Reserve

SITE INFORMATION

Country:

Madagascar

Inscribed in: 1990

Criteria:

(vii) (x)

Site description:

Tsingy de Bemaraha Strict Nature Reserve comprises karstic landscapes and limestone uplands cut into impressive 'tsingy' peaks and a 'forest' of limestone needles, the spectacular canyon of the Manambolo river, rolling hills and high peaks. The undisturbed forests, lakes and mangrove swamps are the habitat for rare and endangered lemurs and birds. © UNESCO

SUMMARY

2014 Conservation Outlook

Good

The outlook for Tsingy de Bemaraha is good. The property is composed of two appropriately managed, legally recognised protected areas and, by virtue of its impenetrable karst landscapes, is largely immune to anthropogenic pressures over much of its area. Threats include logging, subsistence hunting, agricultural encroachment and fire, but these are restricted to the forest edge, and no commercial extraction is known apart from the reptile trade. The property is appreciated by local communities, regional authorities, conservationists and tourists, and the recent description of numerous new mammal, bird, reptile and amphibian species serves to underscore its World Heritage status.

Current state and trend of VALUES

Low Concern

Trend: Stable

The values of the property are well maintained due to the low levels of threat. The unique geomorphological features are not threatened, while loss of forests and subsistence hunting have only minimal impacts on biodiversity values of the property, due to their localized nature.

Overall THREATS

Low Threat

The Tsingy is afforded strong natural protection by its impenetrable nature and isolation, and the level of threat is low. Although local and migrant communities encroach on the property and exert pressures including village and agricultural encroachment, selective logging, livestock grazing in forests, subsistence hunting, the collection of non-timber forest products and, in particular, the renewal of pasture fires, all these threats are highly localized and present little threat to the integrity of the property. With the exception of two reptile species,

no natural resources from the property are known to be traded beyond the local scale. Recent data are lacking for all threats, which require careful monitoring. Natural gas extraction and climate change represent potential future threats.

Overall PROTECTION and MANAGEMENT

Mostly Effective

The majority of the property is naturally protected against threat by its impenetrable nature. It is legally protected and enjoys the support of local communities and regional authorities. An appropriate management system exists, although its effectiveness is unknown and the management plan is out of date.

FULL ASSESSMENT

Description of values

Values

World Heritage values

► Rich endemic flora

Criterion:(x)

The vegetation of the Bemaraha Plateau is dominated by western dry forest (Moat and Smith 2007), one of the most threatened biomes in Madagascar (Ganzhorn et al. 2001). The flora of the dry forest is typically tropophilous, characterized by the genera *Dalbergia*, *Commiphora* and *Hildegardia*; a xerophytic scrub containing succulents grows on exposed rocks, and the more mesic conditions in canyons support a dense subhumid forest (ANGAP 2003, Rasoloarison and Paquier 2003). At least 583 plant species representing 102 families have been recorded (Bemaraha National Park, 2010, based on Randrianarivelo, 1996, Rabarison, 2000, Schatz, 2001, Roger et al, 2004). Although endemism data are not available for the property, nationally 84% of vascular plants are endemic (Callmander et al. 2011). Threatened species include *Khaya madagascariensis* (EN), *Phylloxylon perrieri* (EN), *Dalbergia humbertii* (EN), *D. baronii* (VU) and *Delonix regia* (VU) (ANGAP 2003).

► Rare and endemic birds

Criterion:(x)

The avifauna of the property is rich, with at least 94 recorded species (Rasoloarison and Paquier 2003, Raherilalao and Wilmé 2008). These include members of the endemic family Bernieridae, the near endemic families Vangidae and Leptosomatidae, and the endemic subfamilies Couinae and

Philepittinae. Threatened species include *Haliaeetus vociferoides* (CR), *Ardeola idae* (EN), *Ardea humbloti* (EN), *Anas bernieri* (EN), *Tachybaptus pelzelinii* (EN) and *Circus macroscelus* (VU) (ANGAP 2003, UNEP and WCMC 2011); all but the latter, however, are wetland species and at best occasional visitors to the Manambolo river in the south of the property. Madagascar's newest bird species, the rail *Mentocrex beankaensis*, was described in 2011 and is restricted to the Bemaraha and Beanka massifs (Goodman et al 2011).

► **Rare and endemic reptiles and amphibians**

Criterion:(x)

The Bemaraha Plateau displays extraordinary rates of local endemism amongst its reptiles and amphibians, and represents an important centre of endemism for these groups (Glaw et al. 2009). Of the minimum 63 reptile species recorded (ANGAP 2003, Raselimanana 2008, Bora et al 2010), 58 are endemic to Madagascar and 17 (27%) appear to be endemic to the massif (e.g. Schimmenti and Jesu 1996, Puente et al 2005, Glaw et al 2007a, Köhler et al 2007, Glaw et al. 2009). The 19 species of amphibian recorded represent the highest species richness of any site in the dry regions of Madagascar (Bora et al. 2010), and six of these species (some not yet described) appear to be endemic to the Bemaraha Plateau (Crottini et al. 2011). Several further candidate species of reptile and amphibian await description (Bora et al. 2010, Gardner et al. 2011) and are probably also locally endemic. Threatened species include *Erymnochelys madagascariensis* (CR) *Paroedura tanjaka*, *Uroplatus guentheri*, *Brookesia exarmata*, *B. perarmata*, *Furcifer nicosiai* and *Phisalixella variabilis* (all EN), and *Amphiglossus splendidus*, *Madascincus intermedius*, *Uroplatus ebenau* and *Lycodryas citrinus* (all VU).

► **Rare and endemic mammals**

Criterion:(x)

At least 42 species of mammal have been recorded within the property, of which 35 are endemic to Madagascar. Eleven species of lemur occur, representing five endemic families (Mittermeier et al 2010, UNEP and WCMC 2011); these include *Propithecus deckeni* (VU) and the recently described, locally endemic *Avahi cleesei* (Endangered). The eleven species of small mammal that occur (Soarimalala 2008, Soarimalala and Goodman 2011)

include *Microgale grandidieri* (described in 2009), *Eliurus antsingy* (described in 2001) and *Nesomys lambertoni* (EN); all three are locally endemic to a small area of northwestern Madagascar, although not the property. Two species of carnivore in the endemic family Eupleridae have been recorded (Rasoloarison and Paquier 2003), as well as 18 species of bat (Goodman et al 2005, Kofoky et al. 2007, Goodman 2011).

► **Unique and spectacular geomorphological features**

Criterion:(vii)

The 250 km long Bemaraha Plateau, composed of mid-Jurassic (approximately 200 mya) limestone of marine origin (Du Puy and Moat 1996), is heavily eroded into a karst landscape characterized by networks of deep crevasses, underground rivers and caves, separated by spectacular pinnacles of limestone, up to 100 m high, forming a “forest of sharp stones” (SoOUV, 2012). It forms a unique, spectacular landscape of outstanding beauty (SoOUV, 2012).

Assessment information

Threats

Current Threats

Low Threat

The Tsingy is afforded strong natural protection by its impenetrable nature and isolation, and the level of threat is low. Although local and migrant communities encroach on the property and exert pressures including village and agricultural encroachment, selective logging, livestock grazing in forests, subsistence hunting, collection of non-timber forest products and, in particular, the renewal of pasture fires, all these threats are highly localized and present little threat to the integrity of the property. Recent data are, however, lacking. With the exception of two reptile species, no natural resources from the property are known to be traded beyond the local scale.

► **Subsistence hunting**

Low Threat

Inside site

Outside site

Lemurs such as *Eulemur rufus* (Nash S.D., 2005), *Cheirogaleus medius* and *Lepilemur randrianasoloi* are hunted and trapped in the property by adjacent communities (Ausilio 1993), but impact is limited to areas near villages (IUCN 1990). Lemur trapping necessitates the clearing of small areas of forest, totalling 1.2 ha in 2001 (ANGAP 2003). The turtle *Erymnochelys madagascariensis* (CR) is collected for food from the Manambolo river (ANGAP 2003). Recently the level of threat has been low.

► **Livestock Farming / Grazing**

Low Threat

Inside site

Outside site

Fires are set annually to renew pastures for cattle, but only on the fringes of the World Heritage area (IUCN 1990, Confidential Consultation 2012). Cattle also graze in much of the accessible forest and may reduce regeneration locally (IUCN 1990).

► **Tourism/ visitors/ recreation**

Very Low Threat

Inside site

Outside site

There are few bats in caves visited by tourists, though it is not clear whether this relationship is causal (Kofoky et al. 2007). Some infrastructure (e.g. bridges) can detract from the wilderness aesthetic of the site (pers. obs.). However, tourism is spatially concentrated due to the impenetrable nature of the tsingy, and any impacts are therefore highly localized (Confidential Consultation 2012). Further, the number of visitors is limited by the distance and poor accessibility of the property from the nearest city/commercial airport.

► **Fire/ Fire Suppression**

High Threat

Inside site

Outside site

Fires are set within the property in June-October, before the rainy season, to stimulate the growth of new grass, and to clear trails for people. Tsingy is naturally resistant to fires, however (Rasoloarison and Paquier 2003). Pasture fires may be impossible to eradicate given the cultural importance of cattle, but do little damage to OUV areas and occur only on their fringes (Confidential Consultation 2012).

► **Housing/ Urban Areas**

Data Deficient

Inside site

Outside site

Several villages have been established in the eastern portion of the RNI that have extensive areas of rice paddies (IUCN 1990, Rasoloarison and Paquier 2003). Threat is highly localized and no recent data exist.

► **Crops**

Data Deficient

Inside site

Outside site

Although rice paddies are mentioned by Rasoloarison and Paquier (2003), agricultural encroachment is not listed as a threat in the site management plan (ANGAP 2003). This plan does, however, mention the existence of slash-and-burn cultivation elsewhere. Threat is highly localized though recent data are lacking.

► **Roads/ Railroads**

Low Threat

Inside site

American oil prospectors blasted a seismographic trail through the tsingy in 1984, facilitating access into previously inaccessible areas (IUCN 1990, Rasoloarison and Paquier 2003), and thus contributing to other threats.

► **Other Biological Resource Use**

Low Threat

There is “considerable collection pressure” for honey and tubers from adjacent communities (Fanarena 1999), but this pressure is probably localized and restricted by the impenetrable nature of much of the property.

► **Invasive Non-Native/ Alien Species**

Data Deficient

Outside site

The introduced tree *Ziziphus* sp. (Mokonazy locally) forms thick, monocultural stands in the Melaky region but does not appear to invade intact forest (pers. obs.)

► **Other**

Data Deficient

Inside site

The gecko *Uroplatus henkeli* and, in particular, the highly sought-after dwarf chameleon *Brookesia perarmata* were both formerly collected illegally from within the property (Ramilison and Rabibisoa 1998), but trade in the latter declined following its listing on Appendix I of CITES in 2002 (Carpenter and Robson 2005). Collection apparently continues but at unknown rates (Rasoloarison and Paquier 2003).

► **Identity/ Social Cohesion/ Changes in local population and community**

Low Threat

Inside site

Outside site

Rasoloarison and Paquier (2003) suggest that local communities are “real allies” in the conservation of the tsingy because of the area’s important cultural heritage value, but that the arrival of migrants who don’t share those values has started to “modify this balance”.

Potential Threats

Data Deficient

Although natural gas exists under the property, the combined National Park and World Heritage statuses will probably prevent its destructive extraction.

The impacts of climate change remain unknown.

► **Habitat Shifting/ Alteration**

Data Deficient

The impacts of climate change on the distribution of habitats and species require study, but the Bemaraha Plateau has served as a climatic refugium in the past (Goodman et al. 2008).

► **Droughts**

Data Deficient

The impacts of climate change on the distribution and intensity of precipitation require study.

► **Temperature changes**

Data Deficient

The impacts of climate change on temperature require study.

► **Oil/ Gas exploration/development**

Data Deficient

There are natural gas deposits under the property, but the concession holder Madagascar Oil is staying away from the site, respecting the 2.5 km protective zone (Confidential Consultation 2012). Large tar sand finds elsewhere in Melaky region may transform the regional economy and demographics with unknown impacts on the property.

Protection and management

Assessing Protection and Management

► **Relationships with local people**

Mostly Effective

The local population is generally supportive of the site owing to the revenues generated through tourism and shared with communities as well as other

related economic opportunities. Tourism was also a major reason why the main road into the region was upgraded, allowing local people to take advantage of it. Local people are involved in management of the site, including surveillance, and there is a general sense of pride in it being a WHS (Confidential Consultation 2012)

► **Integration into regional and national planning systems**

Data Deficient

The Melaky region is committed to the protected area (Confidential Consultation 2012), but it is not clear whether the property is integrated into the regional development plan. The property is managed as part of a network under a national plan (PlanGRAP, PNM-ANGAP 2001) but this has not been updated since 2001. Protected area management and expansion (although not the property specifically) was integrated into the Madagascar Action Plan (MAP, GoM 2007), but the MAP has not been retained as a guiding development framework since the political crisis in 2009.

► **Management effectiveness**

Data Deficient

Management is not sufficiently effective at preventing entry and illicit resource use by adjacent communities (Rasoloarison and Paquier 2003), but impacts are small and localized. No evaluations of management effectiveness has been carried out.

► **Legal framework and enforcement**

Mostly Effective

The property is composed of two protected areas, a Strict Nature Reserve (IUCN cat Ia) in the north, and a National Park (IUCN cat II) in the south (UNEP and WCMC 2011); both are governed by national protected areas legislation (Code de Aires Protégées, GoM 2001) which forbids extractive resource use within both categories, but Madagascar National Parks does not have authoritative power to apply the law and relies on state security services.

► **Implementation of Committee decisions and recommendations**

Data Deficient

NA

► **Sustainable finance**

Some Concern

As for other protected areas in Madagascar sustainable funding is a potential problem, but the property makes money through tourism and is considered an exceptional conservation priority, so is likely to be maintained even in periods of duress for Madagascar National Parks (Confidential Consultation 2012). The Fondation des Aires Protégées et Biodiversité de Madagascar has been created to ensure sustainable financing of the protected area system, but is not yet fully capitalized.

► **Sustainable use**

Mostly Effective

National legislation governing the protected area (Code de Aires Protégées, GoM 2001) forbids all extractive use of natural resources, but a local-use exemption could theoretically be granted. All current resource use is illicit, and any potential for sustainable use by local communities is currently unrealized.

► **Education and interpretation programs**

Data Deficient

The 2003 management plan (ANGAP 2003), includes strategies for the sensitization of adjacent communities, and park 'rangers' have an education role, but no data are available.

► **Tourism and interpretation**

Highly Effective

Tourism is well managed and its impacts are highly localized (Confidential Consultation 2012). Infrastructure (trails, viewpoints, bridges etc) is good along well-established circuits, and professional guides are available (pers. obs.). Visitor numbers are constrained by the isolation of the property.

► **Monitoring**

Data Deficient

The management plan for the property (ANGAP 2003) contains an ecological monitoring plan but it is not clear whether the plan was implemented or whether monitoring outputs have been used for adaptive management.

► **Research**

Mostly Effective

The property has been the site of much recent research which has led to the description of several new species (e.g. Glaw et al. 2007, 2009, Köhler et al. 2009, Bora et al. 2010, Goodman et al. 2011). No research infrastructure exists on site.

► **Management system**

Mostly Effective

An appropriate and adequate management plan exists, incorporating analyses of conservation targets and threats, as well as conservation strategies and a monitoring plan (ANGAP 2003). The management plan was updated in 2012 (Madagascar National Parks, 2013)

► **Staff training and development**

Data Deficient

Management capacity was rated as high in 2003 (ANGAP 2003); the staff are committed and some have a good science background (Confidential Consultation 2012). Opportunities for training are unknown but presumably very limited by the isolation of the site. Programme staff training was developed every year by the human resources department of Madagascar National Parks (Randrianasolo, pers.comm.)

► **Boundaries**

Some Concern

Although WHC (2011) notes clarifications of the property boundaries, there appears to remain much confusion about the area and status of the property. The property is known as Tsingy de Bemaraha Strict Nature Reserve (SNR)

and is said to have an area of 152, 000 ha (IUCN 1990, UNEP and WCMC 2011). The southern half of the property, however, has the status of National Park (NP), while the northern half remained a SNR. The area of the two components is given as 72, 340 ha for the NP and 85, 370 ha for the SNR (ANGAP 2003, UNEP and WCMC 2011, MNP 2012) for a contradictory total of 157, 710 ha). While the website of Madagascar National Parks (accessed on 17 July 2014) continues to refer to the northern half of the property as a Strict Nature Reserve, according to Andrianasolo (pers. comm.) the status of the northern half was changed to National Park by Decree nr. 498-2011 of 6 September 2011 – the name of the property should reflect this change. The boundaries of the NP are clear and marked, although those of the SNR were not in 2003 (ANGAP 2003).

Overall assessment of protection and management

Mostly Effective

The majority of the property is naturally protected against threat by its impenetrable nature. It is legally protected and enjoys the support of local communities and regional authorities. An appropriate management system exists, although its effectiveness is unknown and the management plan is out of date.

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

Mostly Effective

Management by MNP is focused within the property, with little or no consideration for the wider landscape or region (ANGAP 2003). There are, however, no regional or local markets in natural resources from the property, and, excepting the issues of human migration, pasture fires and the reptile trade, management beyond the scale of the property is largely unnecessary.

State and trend of values

Assessing the current state and trend of values

World Heritage values

► Rich endemic flora

Low Concern

Trend:Deteriorating

Although fires burn forest edges each year, the majority of vegetation cover is naturally protected by the tsingy and impacts are minimal (Rasoloarison and Paquier 2003, Confidential Consultation 2012).

► Rare and endemic birds

Low Concern

Trend:Stable

No rare or endemic birds appear particularly threatened within the property, although localized subsistence hunting may affect some species.

► Rare and endemic reptiles and amphibians

Low Concern

Trend:Stable

The impact of commercial collection of *Brookesia perarmata* and *Uroplatus henkeli* remains unknown, but is likely highly localized (Rasoloarison and Paquier 2003). Numerous new and locally-endemic species have been recently described (Bora et al. 2010).

► Rare and endemic mammals

Low Concern

Trend:Stable

Although subsistence harvesting may impact some species, particularly lemurs, its impacts are highly localized (Ausilio 1993, ANGAP 2003, Confidential Consultation 2012).

► Unique and spectacular geomorphological features

Good

Trend:Stable

There are no pressures known to negatively impact the tsingy karst itself, apart from the impacts of tourism which are highly localized and well-

managed (Confidential Consultation 2012).

Summary of the Values

► Assessment of the current state and trend of World Heritage values

Low Concern

Trend: Stable

The values of the property are well maintained due to the low levels of threat. The unique geomorphological features are not threatened, while loss of forests and subsistence hunting have only minimal impacts on biodiversity values of the property, due to their localized nature.

Additional information

Key conservation issues

► Clarification of status, nomenclature and area

National

Confusion over the area of the property should be clarified. The name should probably be changed to reflect change in domestic status, i.e. Tsingy de Bemaraha National Park.

► Commercial reptile collection

Local

The extent and impact of collection remain unknown. Management may need to focus on drivers (i.e. global scale) or national enforcement, rather than collection at local level.

► Local resource use

Local

Adjacent communities enter the property to procure natural resources, e.g. wood, bushmeat, honey etc. The extent and impact remain unknown.

► Fire management

Local

Pasture fires are gradually encroaching on the property, and may be very difficult to manage given the cultural importance of cattle.

► Oil and gas

Local

There are natural gas deposits under the property, but the concession holder Madagascar Oil is staying away from the site, respecting the 2.5 km protective zone (Paddack 2012). Large tar sand finds elsewhere in Melaky region may transform the regional economy and demographics with unknown impacts on the property.

Benefits

Understanding Benefits

► Outdoor recreation and tourism

The property is an important tourist destination. Visitor numbers increased by 33% annually between 1992 and 1999 (Rasoloarison and Pacquier 2003), but no up to date data are available.

► Collection of genetic material

The hundreds of species within the property may contain potentially valuable genetic material.

► Collection of timber, e.g. fuelwood

The property provides a range of resources including wood, honey, edible and medicinal plants, bushmeat and so on. These could be sustainably harvesting to provide benefit to adjacent communities, if the legal framework were to be relaxed and an appropriate management mechanism developed.

► **History and tradition**

Rasoloarison and Pacquier (2003) mention the cultural importance of the tsingy to local communities but provide no further details.

► **Importance for research, Contribution to education**

Much biological research has been carried out on the property which contributes to the sum of global knowledge.

► **Carbon sequestration**

The estimated 85, 000 ha of forests (Periodic Reporting 2012) contain unquantified stocks of carbon that would be released if the forests were burned or converted.

► **Water provision (importance for water quantity and quality)**

The Bemaraha Plateau receives considerable precipitation in the rainy season and regulates the hydrology of the region to its west; this includes the Manambolomaty and Bemamba lake complexes, both of high biodiversity importance, as well as an unquantified extent of rice paddies and feed lakes stocked with fish (Rasoloarison and Pacquier 2003).

► **Is the protected area valued for its nature conservation?, Does management of the site provide jobs (e.g. for managers or rangers)?**

The property contains populations of numerous species endemic to Madagascar, many of which, particularly recently-described species, are not known to occur in any other protected areas.

Summary of benefits

The property provides hydrological regulation services to the region to its west, including economically and biologically important wetland areas, and contains 85, 000 ha of carbon-storing forest. Its ecosystems are of global importance for biodiversity conservation as well as providing the opportunity for knowledge

generation and recreation, but its potential for the sustainable provision of forest products has not been realized.

Projects

Compilation of active conservation projects

Nº	Organization/ individuals	Project duration	Brief description of Active Projects
1	Madagascar National Parks		Designated manager of the National Park and Strict Nature Reserve
2	Madagasikara Voakajy		Research organization that received a Darwin award to carry out research into small vertebrates in Bemahara from 2005 to 2008.
3	The Peregrine Fund		Manage the Manambolomaty new protected area, a wetland site to the west of Tsingy de Bemaraha.
4	WWF		Manage a mangrove conservation project to the west of Tsingy de Bemaraha.
5	Durrell Wildlife Conservation Trust		Manage bird conservation projects to the west of Tsingy de Bemaraha.
6	Biodiversity Conservation Madagascar		Manage the Beanka new protected area to the north of Tsingy de Bemaraha

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