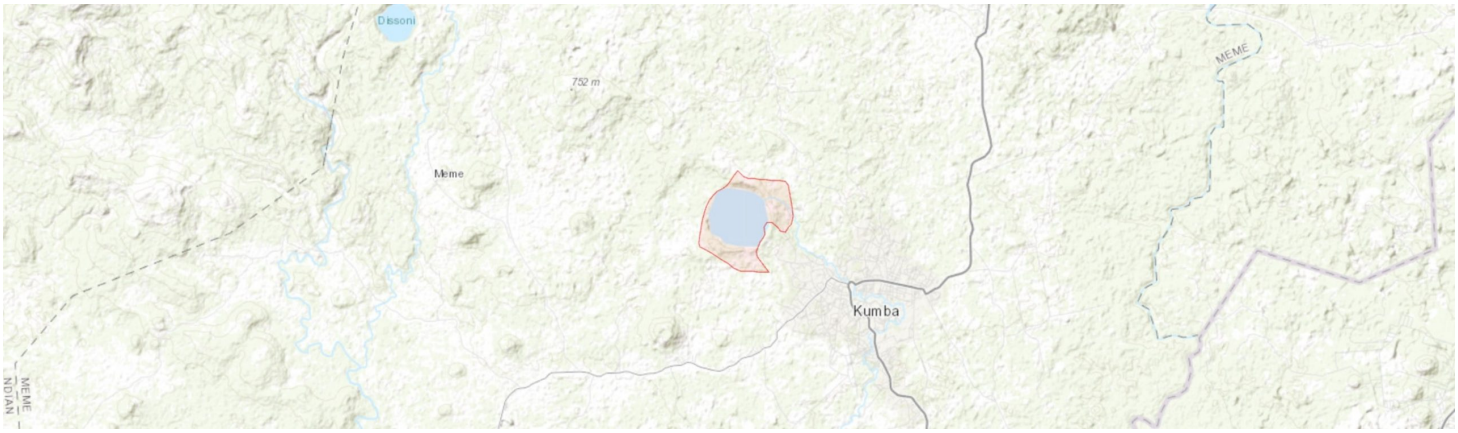
Lake Barombi Mbo Forest Reserve

Elefanten See (Elephant Lake) (Test version)

CMNTIPA032



Country: **Cameroon**
Administrative region: **Southwest (Region)**
Central co-ordinates: **4.66130 N, 9.40200 E**
Area: **9.26km²**

Qualifying IPA criteria

A(i)

IPA assessment rationale

Although a small site, with c.40% of the area open water, Barombi Mbo Forest Reserve qualifies as a potential IPA under criterion A(i) through several globally threatened species, including two considered Critically Endangered and globally endemic to this site, Acridocarpus staudtii and Rhaphiostylis poggei.

Site description

Lake Barombi Mbo is a deep crater lake with a narrow surrounding perimeter of tropical forest, located above the town of Kumba in Meme Division, Southwest Region, Cameroon. It is an internationally recognised RAMSAR site (no. 1643), within a slightly larger national Forest Reserve. The Forest Reserve, covering 926 ha, was established in 1940 by order No. 17, subsequently falling under the 1994 Forest Law (Law No. 94-01) (Fonge, 2019; Schliewen, 2006). The RAMSAR designation, bestowed in 2006 to make it Cameroon's second RAMSAR site, covered only the lake itself and crater rim (415 ha). It was based largely on the remarkable diversity of endemic, sympatrically evolved cichlid fish species and the consequent global significance of the site to evolutionary biology (Schliewen, 2006).

Botanical significance

Together with the larger Southern Bakundu Forest Reserve, Barombi Mbo was considered a second-tier, "meso" hotspot for threatened species by Onana & Cheek (2011). The site is historically important as the original collecting location of several species collected by Preuss and Staudt in the nineteenth century. Much of the more recent scientific collecting at the site and nearby has been by Duncan Thomas of Missouri Botanic Gardens, who lived at Kumba in the 1980s (Onana & Cheek, 2011).
The site is considered the sole location in the world for Acridocarpus staudtii (CR) which was rediscovered there in 1986 and 1999 nearly a century after it was initially collected by Staudt. It is also the site of the only Cameroonian collections of Thunbergia rufescens (CR) and Rhaphiostylis poggei (CR), also made in the 1890s (Lovell & Cheek, 2020a,b). Unfortunately these species have not been rediscovered here and, while the former has been collected in Nigeria, the latter has never been found elsewhere and is thought possibly extinct.
Preuss also first collected Dielsantha galeopsoides (NT) from the location, where again it has also not been recollected. It remains rare but not threatened, having been collected at several other sites (Cheek and Thulin, 2015). Other threatened species such as Pancovia polyantha (CR), Crotonogyne impedita (CR), Deinbollia macrantha (CR) and Strombosia gossweilleri (EN) have been found nearby but not necessarily at the lake site itself (Cheek & Lovell, 2020; Onana & Cheek, 2011).
Pollen cores indicating continuously low grass pollen percentages through the last 25,000 years suggest the Barombi Mbo area may have been a refuge for forest taxa (Giresse 1991; Maley et al., 1990).

Habitat and geology

The crater lake was formed by an explosive eruption around 1 Ma which punched through basaltic layers and older basement complex

rocks (Maley et al., 1990). Three successive volcanic series are evident at the site, a Tertiary age "lower black series", a Neogene "medium white series" of trachytes and phonolites, and a Quaternary basaltic "upper black series". The latter series is most prominent but older basement-complex crystalline rocks also outcrop in the catchment area west of the lake and influence the lake sediment (Maley, 1990; Giresse et al., 1991). Within the steep, c.100 m crater wall itself, two similar series of basaltic tuff lapilli are evident (Schliewen, 2006).

The surface of the lake today is approximately 315 m.a.s.l. Unlike some similar crater lakes in the region, Lake Barombi Mbo has an inflow and outflow. The outlet, the Kaké, believed to be of recent age, flows through a steep gorge in the southeastern rim and serves the town of Kumba as the major water resource before joining the Mungo river system (Schliewen, 2006). The inlet on the eastern side, the river Sofo, and its tributary Toh Mbok, are disconnected from major river systems and the drainage basin extends only to the perimeter of the older, secondary crater area (c. 8 km2) immediately adjacent to the lake.

The site has a two-season equatorial climate with a short dry season from December to February and 3,000–4,000 mm total precipitation per year (Fonge et al., 2019). Schliewen (2006) reports a lower range of 1,825–3,000 mm p.a. Mean annual temperature is reported as 18° C by Schliewen (2006), with humidity ranging between 70–84%.

The lake lies within Letouzey & Fotius's (1985) wet Atlantic–Biafran zone of the evergreen, Guineo–Congolian rainforest (Cross–Sanaga–Bioko coastal forests ecoregion of Olson et al., 2001). More precisely, it is part of subcategory 228, "Foret Atlantiques biafreenes à Caesalpinaceae", of Letouzey & Fotius's (1985) vegetation classification. However, pockets of semi-deciduous forest also occur in this area.

Conservation issues

The nearby town of Kumba is a regional transport hub and trade centre with a growing population. Demand for land, timber and fuel wood associated with this growth have driven extensive habitat loss and degradation in the area, and these are the main threats to the forest at Barombi Mbo (Cheek & Lovell, 2020; Fonge et al., 2019; Sounders and Kimengsi, 2011). Fonge et al. (2019) found that 90% of dense forest cover in the 3,000 ha surrounding the lake had been lost between 1986 and 2014, mainly through conversion to open forest and forest mosaic. Cocoa cultivation appears to be a major driver of this change, along with oil palm and subsistence crops like cocoa yams (Fonge et al., 2019). An agro-industrial plantation has also been designated 1 km to the north of the lake (MINFOF & WRI, 2020) and satellite imagery suggests it may already have exceeded its boundaries in the direction of the lake.

A greater proportion of dense forest has survived in the area immediately bordering the lake which constitutes the protected area (Fonge et al., 2019). However, this is unlikely to be large enough to support rare species in isolation in the long-term, and this forested perimeter has also suffered loss, with farming occurring within the crater rim itself (Schliewen, 2006; Fonge et al., 2019).

Conversion to farmland threatens the aquatic biodiversity of the lake. The western rim of the lake is lower than that on the other sides and there is consequently a large catchment area to the immediate west of the lake, apparently on the site of a second, shallow, filled-in lake crater (Giresse et al., 1994). Ferralitic soils have developed on this area and there are many scattered buildings and signs of forest clearance and agriculture. Apart from loss of forest, disturbance to this area threatens the high clarity and unique chemical balance of the lake water (Schliewen, 2006). It is to be recommended that this area is treated as part of the conservation area up to the watershed approximately 2 km west of the lake's west rim. This would also increase the area and chance of survival for threatened plant species. Regular fish-death events seem to take place associated with increased turbidity from natural causes but pesticide contamination, and phosphate and heavy metal enrichment from cocoa farms could also threaten the lake ecology (Fonge et al, 2019; Schliewen, 2006).

Over-fishing and apparent introduction of non-native fish species are additional threats to the extremely important aquatic fauna (Schliewen, 2006). Unsustainable extraction of drinking water for the growing town of Kumba may also become a concern (Schliewen, 2006)

Kumba has good transport connections and the site is a potential tourist attraction. This has so far not been developed, but local schools use the site for educational purposes (Schliewen, 2006).

Site assessor(s)

Bruce Murphy, Royal Botanic Gardens, Kew

Martin Cheek, Royal Botanic Gardens Kew

IPA criterion A species

SPECIES	QUALIFYING SUB-CRITERION	≥ 1% OF GLOBAL POPULATION	≥ 5% OF NATIONAL POPULATION	1 OF 5 BEST SITES NATIONALLY	ENTIRE GLOBAL POPULATION	SOCIO-ECONOMICALLY IMPORTANT	ABUNDANCE AT SITE
Psychotria minimicalyx K.Schum	A(i)	✓	✓	✓	–	–	
Pavetta muiriana S.D.Manning	A(i)	✓	✓	✓	–	–	
Rutidea nigerica Bridson	A(i)	–	–	✓	–	–	
Whitfieldia preussii (Lindau) C.B.Clarke	A(i)	✓	–	–	–	–	
Calycobolus micranthus (Dammer) Heine	A(i)	✓	✓	✓	–	–	
Medusandra richardsiana Brenan	A(i)	✓	✓	✓	–	–	
Pauridiantha divaricata (K.Schum.) Bremek.	A(i)	✓	✓	–	–	–	
Aristolochia preussii Engl.	A(i)	✓	–	✓	–	–	
Trichostachys interrupta K.Schum.	A(i)	✓	–	✓	–	–	
Isonema buchholzii Engl.	A(i)	✓	✓	✓	–	–	
Acridocarpus staudtii (Engl.) Engl. ex Hutch. & Dalziel	A(i)	✓	✓	✓	✓	–	
Thunbergia rufescens Lindau	A(i)	✓	✓	✓	–	–	
Ritchiea macrantha Pax & Gilg	A(i)	–	✓	✓	–	–	
Rhaphiostylis poggei Engl.	A(i)	✓	✓	✓	✓	–	
Deinbollia macrantha Radlk.	A(i)	✓	✓	✓	✓	–	
Begonia preussii Warb.	A(i)	✓	–	–	–	–	
Psychotria moliwensis	A(i)	✓	–	✓	–	–	

SPECIES	QUALIFYING SUB-CRITERION	≥ 1% OF GLOBAL POPULATION	≥ 5% OF NATIONAL POPULATION	1 OF 5 BEST SITES NATIONALLY	ENTIRE GLOBAL POPULATION	SOCIO-ECONOMICALLY IMPORTANT	ABUNDANCE AT SITE
fernandopoensis							
Strychnos staudtii Gilg	A(i)	✓	–	–	–	–	
Trichilia zewaldae J.J.de Wilde	A(i), A(iii)	✓	–	✓	–	–	
Pancovia polyantha Gilg ex Engl.	A(i)	✓	✓	✓	✓	–	
Psychotria asterogramma O.Lachenaud	A(i)	–	–	✓	–	–	

IPA criterion C qualifying habitats

HABITAT	QUALIFYING SUB-CRITERION	≥ 5% OF NATIONAL RESOURCE	≥ 10% OF NATIONAL RESOURCE	1 OF 5 BEST SITES NATIONALLY	AREAL COVERAGE AT SITE

General site habitats

GENERAL SITE HABITAT	PERCENT COVERAGE	IMPORTANCE
Forest - Subtropical/Tropical Moist Lowland Forest	–	Major

Land use types

LAND USE TYPE	PERCENT COVERAGE	IMPORTANCE
Nature conservation	45	Major
Agriculture (arable)	–	
Tourism / Recreation	–	
Forestry	100	

Threats

THREAT	SEVERITY	TIMING
Agriculture & aquaculture - Annual & perennial non-timber crops - Shifting agriculture	High	Ongoing - increasing
Pollution - Agricultural & forestry effluents - Nutrient loads	Unknown	Future - inferred threat
Pollution - Agricultural & forestry effluents - Soil erosion, sedimentation	Unknown	Future - inferred threat
Pollution - Agricultural & forestry effluents - Herbicides and pesticides	Unknown	Future - inferred threat

THREAT	SEVERITY	TIMING
Invasive & other problematic species, genes & diseases - Invasive non-native/alien species/diseases	High	Future - inferred threat
Natural system modifications - Dams & water management/use - Abstraction of surface water (domestic use)	Medium	Future - inferred threat
Residential & commercial development - Housing & urban areas	Medium	Ongoing - trend unknown
Agriculture & aquaculture - Annual & perennial non-timber crops - Agro-industry farming	Medium	Ongoing - trend unknown
Biological resource use - Logging & wood harvesting	High	Ongoing - trend unknown
Biological resource use - Fishing & harvesting aquatic resources	Medium	Ongoing - trend unknown

Protected areas

PROTECTED AREA NAME	PROTECTED AREA TYPE	RELATIONSHIP WITH IPA	AREAL OVERLAP
Barombi Mbo Forest Reserve	Forest Reserve (conservation)	protected/conservation area matches IPA	9

Conservation designation

DESIGNATION NAME	PROTECTED AREA	RELATIONSHIP WITH IPA	AREAL OVERLAP
Barombi Mbo Crater Lake	Ramsar	IPA encompasses protected/conservation area	4

Management type

MANAGEMENT TYPE	DESCRIPTION	YEAR STARTED	YEAR FINISHED
No management plan in place		–	–

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