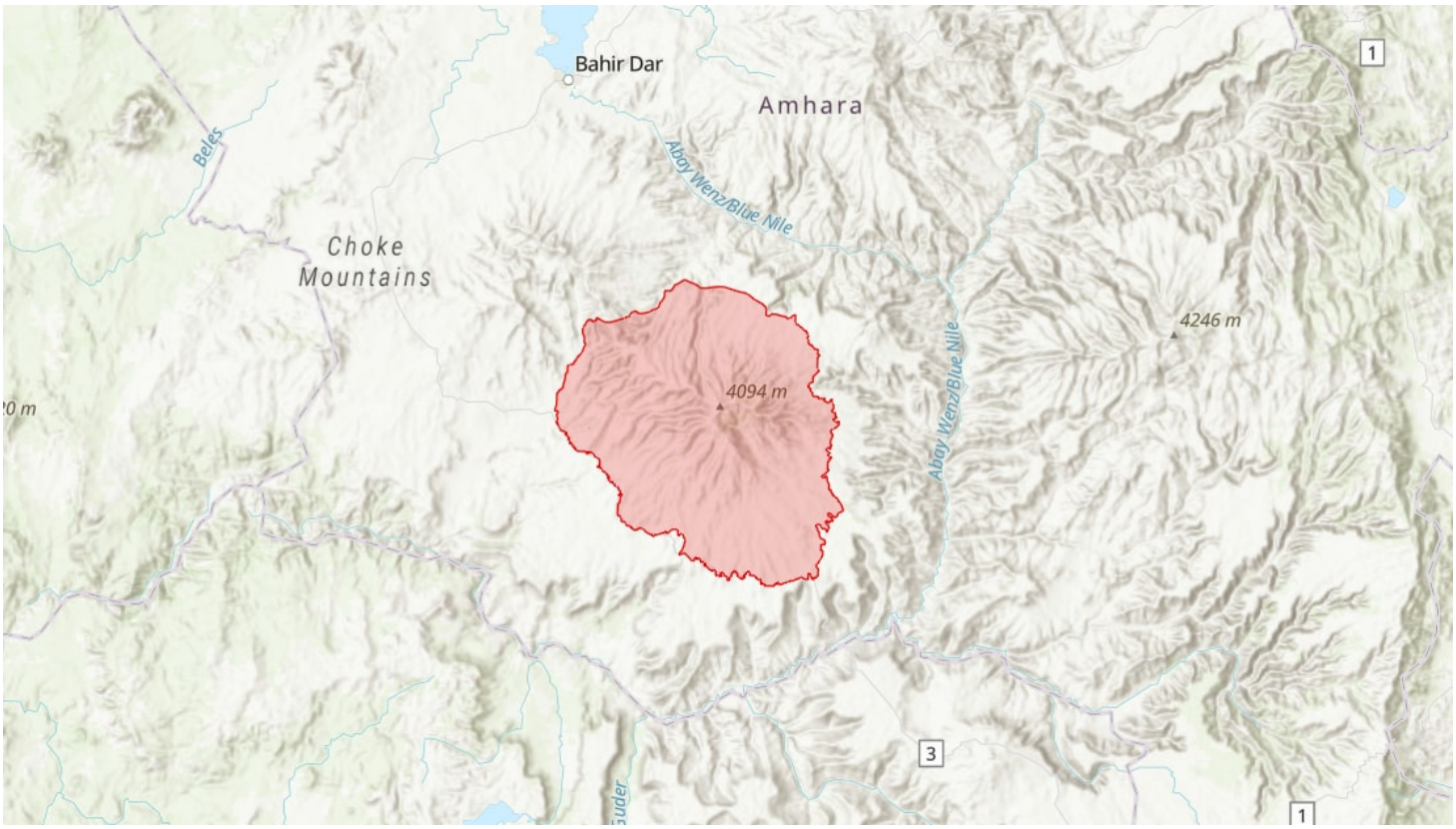
Choke Mountains

ETHTIPA013



Country: **Ethiopia**
Administrative region: **Amhara (Regional State)**
Central co-ordinates: **10.75641 N, 37.74826 E**
Area: **5578km²**

Qualifying IPA criteria

A(i)

IPA assessment rationale

The Choke Mountains qualifies as an IPA under criterion A(i) due to the presence of eleven globally threatened species: Crepis achyrophoroides (EN), Poa chokensis (EN), Habenaria excelsa (EN), Thunbergia hirsuta (EN), Ceropegia loranthiflora (VU), Crepis tenerrima (VU), Disperis galerita (VU), Helichrysum hedbergianu (VU), Hyparrhenia tuberculata (VU), Ledebouria urceolata (VU) and Senecio farinaceus (VU). There are significant threats to these species and the wider landscape, principally due to agricultural expansion across the mountain range over the last three decades. The presence of several endemic species that are yet to be Red Listed is also significant as future assessments may lead to further threatened species being identified within the IPA.

Site description

The Choke Mountains IPA is situated in the Gojam floristic region and East and West Gojam zones of Amhara Regional State, in the northwestern highlands of Ethiopia (Haile, 2015). The IPA is located to the south-southeast of Lake Tana, with the towns of Bahir Dar to the northwest, and Debre Markos to the south. The IPA has been extensively degraded through agricultural expansion, resource exploitation and overgrazing, with agricultural fields found as high as 3,800 m (Simane et al., 2013), thus threatening the site's biodiversity. Given that the IPA supports many endemic and globally threatened plant species, some of which are only found in one or two other locations globally, further degradation poses significant threats to the site's floristic diversity.

The Choke Mountains are considered to be one of East Africa's 'water towers', serving as the headwaters of surrounding streams and rivers, including the Upper Abbay (Blue Nile) River, the largest tributary of the Nile (Teferi et al., 2010; Haile, 2015). Over 50 of the Abbay's tributaries originate from the Choke Mountain range, accounting for over 85% of the river's total flow (Alemneh et al., 2017; Gessesse et al., 2019). The Choke Mountains are also designated as an Important Bird Area (IBA) and Key Biodiversity Area (KBA).

Botanical significance

The Choke Mountains IPA is an important site for ten globally threatened, Ethiopian endemic species: Crepis achyrophoroides (EN), Habenaria excelsa (EN), Thunbergia hirsuta (EN), Ceropegia loranthiflora (VU), Crepis tenerrima (VU), Disperis galerita (VU), Helichrysum hedbergianum (VU), Hyparrhenia tuberculata (VU), Ledebouria urceolata (VU) and Senecio farinaceus (VU). While none of these species are endemic to this site specifically, three (Crepis achyrophoroides, Crepis tenerrima and Thunbergia hirsuta) are only known to occur in one other locality and are thus particularly vulnerable to further habitat degradation and fragmentation. In addition, the IPA supports the near-endemic, globally threatened species, Poa chokensis (EN), which is only known to occur at one other site, on Mount Elgon in Uganda.

An additional 38 Ethiopian endemics or near-endemics are known to be present within the IPA, based on georeferenced herbarium records. Most of these species are yet to be Red Listed, so further threatened species may be added in due course. One notable species that has been assessed and occurs in the IPA is the important medicinal herb, Echinops kebericho (NT). Other extant species include Aloe trigonantha (LC), Thesium matteii (DD) and Vachellia (Acacia) negrii (NT). In addition to these 38 species, Fetene et al. (2014) report another endemic in the Choke Mountains, namely Euryops antinorii. This species is apparently locally abundant, although there are no known supporting herbarium vouchers to confirm its presence in the IPA.

Habitat and geology

The IPA is mountainous with deep incised valleys and gorges (Teme et al., 2018; Key Biodiversity Areas, 2020). Mount Choke is the highest peak at just over 4,070 m. Land cover types include grasslands, shrublands, agricultural land, urban areas and wetlands (Fetene et al., 2014; Simane et al., 2014). The Choke Mountains are a source of over 23 major rivers, including the Muga, Chemoga, Abeya and Techma rivers, and 273 streams that discharge into the Abbay (Blue Nile) River (Fetene et al., 2014; Haile, 2015). Agriculture within the IPA is largely mixed crop and livestock subsistence farming (Simane et al., 2014). In the highlands, the main crops are barley, potato, fava bean and engido (Avena spp.), whereas maize, tef and wheat are more common at mid elevations (Simane et al., 2013).

Historically, the Choke Mountains were covered by a mosaic of dense, dry Afromontane forest, shrubland and grassland and patches of Ericaceous bushland (Friis et al., 2010; Teferi et al., 2010; Fetene et al., 2014). However, due to extensive agricultural expansion, the mountain range has been largely cleared of its natural forests (Kerato, 2014). The summit is characterised by Afroalpine and sub-Afroalpine vegetation, dominated by shrublands, grasslands and moist moorlands (Simane et al., 2013; Haile, 2015). Moist moorlands are sparsely covered with Lobelia rhynchopetalum, Alchemilla spp., Festuca spp. and other grasses (Teferi et al., 2010; Simane et al., 2013; Fetene et al., 2014). Fetene et al. (2014) found Euryops antinorii to be the most dominant herbaceous plant, often utilised by local communities for fuel, in spite of the aforementioned absence of herbarium vouchers for this species in the IPA. Additionally, Subularia monticola is commonly found along streams (Fetene et al., 2014). Haile (2015) reported 142 species across 103 genera and 40 families within this Afroalpine zone.

The IPA has very little natural woody plant cover remaining; Erica arborea (LC) and Hypericum revolutum (LC) are only found in patches (Simane et al., 2013; Simane et al., 2014). Bamboo (Oldeania alpina) occurs naturally in sparse patches and homestead plantations (Teferi et al., 2010; Simane et al., 2014), and exotic Eucalyptus globulus plantations are extensive throughout the IPA, which many communities rely on as a source of income (Teferi et al., 2010; Simane et al., 2014). Adane et al. (2015) also reported the presence of the globally threatened but widespread timber species, Prunus africana (VU). Four community types are thought to exist across the Choke Mountain range (Kerato, 2014). The lower elevations and surrounding areas (c. 1050 m to 2800 m) are characterised by two dominant tree species (Vachellia (Acacia) abyssinica and Croton macrostachyus) and one dominant shrub species (Grewia bicolor). Between c. 1400 m and 1700 m, Tamarindus indica, Albizia isenbergiana and Dichrostachys cinerea are the three characteristic species. A third community is the Phytolacca dodecandra – Dombeya torrida community in the mid elevations of the IPA, comprising a variety of woody species, many of which match those reported by Simane et al. (2013). Above c. 3500 m, an Erica arborea community is found, where Erica arborea, Hypericum quartinianum, Helichrysum citrispinum and Euryops pinifolius predominate (Kerato, 2014; Haile, 2015).

The IPA has six major agroecosystem (AES) zones (Simane et al., 2013). Agricultural activity is intense in AES 1 to 4. The Lowland and Abbay valley (AES 1), found in the northern region of the IPA and surrounding areas, is characterised by rugged terrain and extensive land degradation. Bamboo (Oxytenanthera abyssinica) and Acacia spp. are especially common (Simane et al., 2013). The Midland plains with black soil (AES 2) are found on the IPA's eastern slopes, towards the towns of Felege Birhan, Bichena, and Dejen. Prunus africana, Hagenia abyssinica, Erythrina brucei and Oldeania alpina occur sparsely within this AES. The Midland plains with brown soil (AES 3) are found in the southern extremes of the IPA and the Midland sloping lands (AES 4) are located on its southern slopes, the latter dominated by Eucalyptus plantations. The Hilly and Mountainous highlands (AES 5) dominate the upper regions of the IPA (2800-3800 m), with dominant native species including Juniperus procera, Erica arborea, Hagenia abyssinica, Hypericum revolutum and Olea europaea. The summit of the IPA (>3800 m) - an important region for biodiversity and soil/water retention - is classed as Afro Alpine (AES 6), where the major natural habitat is moist moorlands.

The Choke Mountain range is comprised of inactive shield volcanoes, formed across the Oligocene and Miocene epochs, surrounded by flood basalts (Habtamu, 2003; Teferi et al., 2010;

Fetene et al., 2014; Adane et al., 2015; Haile, 2015). The IPA consists of around ten main deposits, predominantly different varieties of basalt (Blond et al., 2015). Soils are principally haplic alisols, eutric vertsiols, eutric Leptosols, and luvisols (Teferi et al., 2010; Simane et al., 2013; Blond et al., 2015). Soils at higher elevations are typically greyish brown, derived from shield volcano lavas, whereas soils at lower elevations are reddish brown, derived from flood basalts (Simane et al., 2010; Blond et al., 2015).

The climate of the IPA falls within the Wurch (cool highlands, > 3000 m), Dega (cool highlands, 2500-3000 m), and Woina-Dega (temperate highlands, 1500-2500 m) agroclimatic zones (Haile, 2015). There is thus considerable local variability in rainfall and temperature associated with the IPA's topographic gradients (Zaitchik et al., 2012): the summit of the mountain has a mean annual temperature of 7.5 – 8C, while the base of the mountain range has a mean annual temperature of approximately 25 – 30.5C (Teferi et al., 2010; Simane et al., 2013; Kerato, 2014). Rainfall is unimodal, with the wet season occurring from May to October (Haile, 2015). Rainfall ranges from 600 mm to 2000 mm per year (Teferi et al., 2010; Adane et al., 2015), although the IPA's western slopes tend to be wetter than its eastern slopes (Simane et al., 2013).

Conservation issues

There is currently no formal site protection or management plan in place within the IPA. The Choke Mountains were designated as an Important Bird Area (IBA) in 1996 under criteria A1 and A3, based on the occurrence of 16 resident species (BirdLife, 2021). A 1995 survey reported 49 bird species, including the Abyssinian Longclaw (Macronyx flavicollis, NT) (BirdLife, 2021). The Choke Mountains Key Biodiversity Area (KBA) was last assessed in 2011 and is a priority for reassessment (Key Biodiversity Areas, 2020).

Some patches of ericaceous forest near the summit have been traditionally conserved by the local community since 1987 (Fetene et al., 2014). These patches are referred to as Aba Jime Forest, named after the monk who established their conservation (Fetene et al., 2014). Local priests also contribute to the protection of the forest by condemning forest clearance at Sunday Church programs (Fetene et al., 2014). However, conversion of montane vegetation to agricultural fields and pasture land continues (Fetene et al., 2014), in part due to increasing population pressures, which have contributed to cultivation, tree cover loss and natural habitat degradation at altitudes as high as 3,800 m (Simane et al., 2013). Forest was rapidly converted to cropland and pastureland, and was over-exploited for fuelwood and construction material, after the Derg Regime ceased in 1991 (Fetene et al., 2014). The remaining areas of intact forest are used as shade during drought periods and the vegetation is used to fatten livestock (Fetene et al., 2014). Areas that once contained dense stands of Hypericum revolutum are now bare, and the once abundant Ericaceous bushland is now largely fragmented (Fetene et al., 2014). Riverine trees within the Chemoga watershed declined by 79% between 1957 and 1998, largely due to cultivation (Bewket, 2002).

The Choke Mountain range is thus one of the most intensively cultivated areas in Ethiopia. Between 1986 and 2011, cropland increased by 206%, while forested areas decreased by 79%, grasslands by 40%, and shrublands by 17% (Fetene et al., 2014; Gessesse et al., 2019). Cultivated areas extend from the Abbay River gorge up to the summit of the Choke Mountains (Simane et al., 2013). Declining productivity of agricultural fields, due to unsustainable methods and soil degradation, has contributed to further agricultural expansion (Simane et al., 2012; Gessesse et al., 2019). Additionally, soil acidity is increasing and is likely causing a decline in crop yields (Simane et al., 2013). Erosion rates are also high, with soil erosion prominent across much of the mountain range (Simane et al., 2013; Blond et al., 2015; Gessesse et al., 2019). This is likely exacerbated by traditional crisscross ox-drawn tillage (Simane et al., 2013). It has also been estimated that agricultural land from the highland areas in the IPA area are a major sediment source into the Abbay River (Bewket & Teferi, 2009; Blond et al., 2015).

Additional threats include land conversion for Eucalyptus plantations and diversion of streams for irrigation (Simane et al., 2012; Fetene et al., 2014; Haile, 2015; Alemneh et al., 2017; Gessesse et al., 2019). Climate change is also thought to be a contributing factor, with an increase in regional temperatures and extreme rain events within the last 20 years (Simane et al., 2012). Studies have also shown that agricultural expansion in Choke is linked with a declining abundance of bird species and falling aquatic macro-invertebrate diversity (Alemneh et al., 2017; Takele & Afework, 2018).

Site assessor(s)

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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
Crepis achyrophoroides Vatke	A(i)	✓	✓	✓	–	–	Unknown
Crepis tenerrima Sch.Bip. ex Oliv.	A(i)	✓	✓	✓	–	–	Unknown
Poa chokensis S.M.Phillips	A(i)	✓	✓	✓	–	–	Unknown
Disperis galerita Rchb.f.	A(i)	✓	✓	✓	–	–	Unknown
Habenaria excelsa S.Thomas & P.J.Cribb	A(i)	✓	✓	✓	–	–	Unknown
Senecio farinaceus Sch.Bip. ex A.Rich.	A(i)	✓	✓	✓	–	–	Unknown
Ledebouria urceolata Stedje	A(i)	✓	✓	✓	–	–	Unknown
Hyparrhenia tuberculata Clayton	A(i)	✓	✓	✓	–	–	Unknown
Thunbergia hirsuta T.Anderson	A(i)	✓	✓	✓	–	–	Unknown
Ceropegia loranthiflora K.Schum.	A(i)	✓	✓	✓	–	–	Unknown
Helichrysum hedbergianum Mesfin & T.Reilly	A(i)	✓	✓	✓	–	–	Unknown
Prunus africana (Hook.f.) Kalkman	A(i)	–	–	–	–	–	Unknown

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 Montane Forest	–	Minor

GENERAL SITE HABITAT	PERCENT COVERAGE	IMPORTANCE
Shrubland - Subtropical/Tropical High Altitude Shrubland	—	Major
Grassland - Subtropical/Tropical High Altitude Grassland	—	Major
Wetlands (inland) - Permanent Rivers, Streams, Creeks [includes waterfalls]	—	Major
Wetlands (inland) - Alpine Wetlands [includes temporary waters from snowmelt]	—	Major
Rocky Areas - Rocky Areas [e.g. inland cliffs, mountain peaks]	—	Major
Artificial - Terrestrial - Arable Land	—	Major
Artificial - Terrestrial - Pastureland	—	Major
Artificial - Terrestrial - Plantations	—	Major
Artificial - Terrestrial - Urban Areas	—	Minor
Artificial - Terrestrial - Subtropical/Tropical Heavily Degraded Former Forest	—	Major

Land use types

LAND USE TYPE	PERCENT COVERAGE	IMPORTANCE
Agriculture (arable)	—	Major
Agriculture (pastoral)	—	Unknown
Tourism / Recreation	—	Minor
Forestry	—	Minor
Residential / urban development	—	Minor
Harvesting of wild resources	—	Minor

Threats

THREAT	SEVERITY	TIMING
Residential & commercial development - Housing & urban areas	Medium	Ongoing - trend unknown
Agriculture & aquaculture - Annual & perennial non-timber crops - Shifting agriculture	High	Ongoing - increasing
Agriculture & aquaculture - Wood & pulp plantations - Small-holder plantations	High	Ongoing - increasing
Agriculture & aquaculture - Livestock farming & ranching - Small-holder grazing, ranching or farming	High	Ongoing - trend unknown
Biological resource use - Logging & wood harvesting	High	Ongoing - trend unknown
Climate change & severe weather	Unknown	Ongoing - trend unknown
Agriculture & aquaculture - Annual & perennial non-timber crops - Small-holder farming	High	Ongoing - increasing

Protected areas

PROTECTED AREA NAME	PROTECTED AREA TYPE	RELATIONSHIP WITH IPA	AREAL OVERLAP
Aba Jime Forest	Community conservation area	IPA encompasses protected/conservation area	–

Conservation designation

DESIGNATION NAME	PROTECTED AREA	RELATIONSHIP WITH IPA	AREAL OVERLAP
Choke Mountains IBA	Important Bird Area	IPA encompasses protected/conservation area	1085
Choke Mountains KBA	Key Biodiversity Area	IPA encompasses protected/conservation area	1085

Management type

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

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