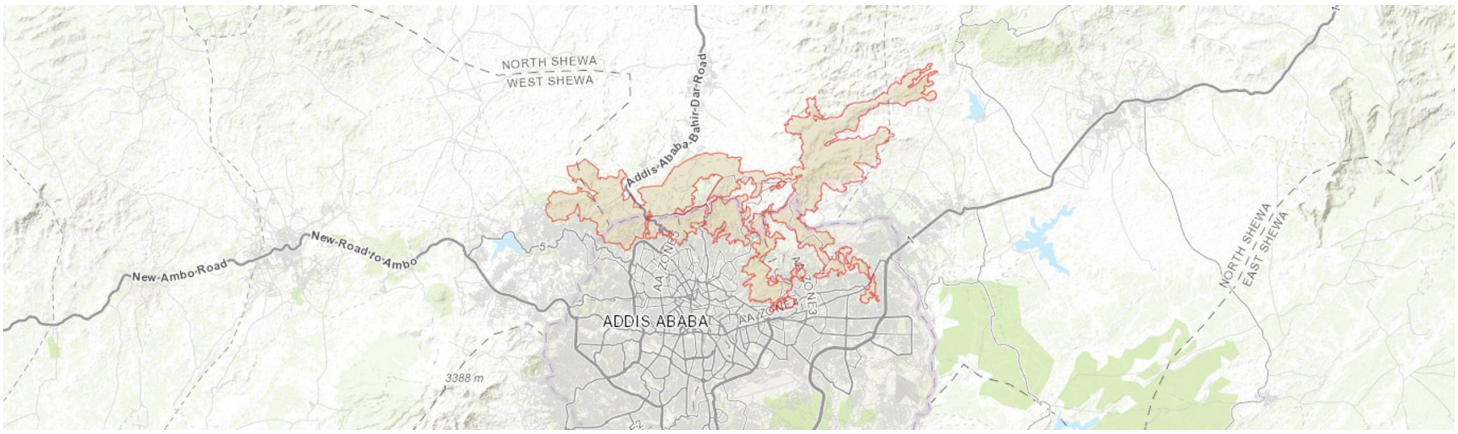
Entoto Hills

ETHTIPA005



Country: **Ethiopia**
Administrative region: **Oromia (Regional State)**
Central co-ordinates: **9.08789 N, 38.74266 E**
Area: **114km²**

Qualifying IPA criteria

A(i), C(iii)

IPA assessment rationale

Entoto Natural Park and Escarpment is a key remnant of the nationally threatened Dry Afromontane Forests. The natural forest at this site had largely been replaced with plantations of Eucalyptus globulus in the past but work is underway to restore the natural Juniper forest with considerable success. This site therefore qualifies as an IPA under criterion C(iii), thought to contain more than 5% of a nationally threatened habitat. This site also qualifies under criterion A(i) due to the presence of four globally Vulnerable Ethiopian endemic species.

Also of note is the high number of medicinal plant species, including the endemic Echinops kebericho (NT). The site also contains the widespread but threatened timber species Prunus africana (VU), and a high number of Ethiopian endemics, including being a key locality for Trifolium pichisermollii (NT).

Site description

The Entoto Hills IPA lies approximately 5 km north of Addis Ababa city centre. The site is located partly within the Addis Ababa City Administration and partly within the Oromia Regional State on the central Ethiopian plateau, within the Shewa floristic region. The altitude of the IPA ranges from 2,560-3,200 m, with the highest peak being Mount Entoto which overlooks Addis Ababa (Atinafe et al., 2020).

The IPA is comprised of the extinct volcanic Entoto mountain chain and surrounding escarpments. The topology is characterised by undulating hills, mountainous terrain, the flat-topped plateau of Mount Entoto, and many streams and rivers that form steep gulleys. The mountainous regions of the IPA forms the watershed boundary of the Abbay (Blue Nile) and Awash rivers (Telake, 2009; Woldegerima et al., 2017). The natural vegetation is dominated by Dry Afromontane Forest (Friis et al., 2010).

The Gullele Botanic Garden, the first botanic garden to be established in Ethiopia, is located within the IPA. This site was initiated in 2005 when 705 ha of land was promised by the Addis Ababa City Administration to the establishment of the garden (Gullele Botanic Garden, 2021). The garden aims to collect, propagate, and preserve the Ethiopian endemic flora and to help restore the natural habitats that support these species, to serve as an open ended case study for forest restoration, to replace exotic tree species (Eucalyptus) with native species, and to focus on conservation, research, education, and ecotourism (Reeder, 2013; Gullele Botanic Garden, 2021).

Entoto Natural Park and Escarpment is designated as an Important Bird Area (IBA) and Key Biodiversity Area (KBA). The Entoto Natural Park and Gullele Botanic Garden are popular tourist destinations for bird watching and hiking as well as general recreation.

Botanical significance

The Entoto Natural Park, Escarpment, and Gullele Botanic Garden are characterised by high densities of naturally regenerated woody species such as Juniperus procera Hochst. ex Endl., Olinia rochetiana A.Juss., Rosa abyssinica Lindl., Maesa lanceolata

Forssk., Sideroxylon oxyacanthum (Baill.) Aubrév. and Carissa spinarum L. (Telake, 2009; Atinafe et al., 2020; Birhanu B. Telake, pers. obs.). Woldegerima et al. (2017) found that areas of the forest dominated by Juniperus procera regeneration have a higher diversity than areas dominated by the exotic Eucalyptus globulus Labill.. Over 220 plant species, across 66 families, have been recorded within the IPA (Telake, 2009; Woldegerima et al., 2017; Atinafe et al., 2020). Habitat is categorised under the Dry evergreen Afromontane Forest and grassland complex (DAF) (Friis et al., 2010), a nationally threatened habitat that has been greatly reduced in extent.

The Gullele Botanic Garden, located within the IPA, is a key locality for the globally threatened, Ethiopian endemic, Gymnosporia addat Loes. (previously Maytenus addat; VU). The Entoto Hills also support important populations of three further Ethiopian endemics proposed to be globally Vulnerable, Chrysojasminum stans (Pax) Banfi, Hyparrhenia tuberculata Clayton and Helichrysum hedbergianum Mesfin & T.Reilly, and are known to be a key locality for the Near Threatened endemic Trifolium pichisermollii J.B.Gillett. In total, the IPA is known to contain at least 23 Ethiopian endemics based on the findings of Telake (2009), Woldegerima et al., (2017), and Atinafe et al. (2020), including Aloe debrana Christian (LC), Solanecio gigas (Vatke) C. Jeffrey, and Acacia (Vachellia) negrii (Pic.Serm.) Kyal. & Boatwr. (NT), updated according to POWO (2021). Some endemics, such as Impatiens rothii Hook.f., are known to occur in more open grassland and rocky outcrops at higher elevations within the IPA, which support interesting herbaceous communities.

Telake (2009) recorded 71 species of medicinal plants within Gullele Botanic Garden. The five most commonly used species are Gymnanthemum amygdalinum (Delile) Sch.Bip., Hagenia abyssinica (Bruce) J.F.Gmel., Phytolacca dodecandra L'Hér., Stephania abyssinica (Quart.-Dill. & A.Rich.) Walp., and Lippia abyssinica (Otto & A.Dietr.) Cufod. (Telake, 2009). The widely used medicinal Ethiopian endemic, Echinops kebericho Mesfin (NT) is also used by traditional healers in the Entoto area.

Also of note is the presence of the widespread medicinal timber species, Prunus africana (Hook.f.) Kalkman (VU), which has low abundance and regeneration in the forest (Telake, 2009); and, Juniperus procera (LC, but decreasing globally), one of the most dominant species within the IPA and a highly economically important tree species in Ethiopia. The globally endangered Coffea arabica L. has been introduced to the site.

Two globally threatened species, Carex monostachya A.Rich. (VU) and Indigofera rothii Baker (EN), were recorded in the KBA assessment for Entoto Natural Park and Escarpment (Key Biodiversity Areas, 2020), however this appears to be incorrect.

Habitat and geology

The topology of the IPA is characterised by undulating hills to mountainous terrain, the flat-topped plateau of Mount Entoto, and rivers and streams that form deep gulleys (Woldegerima et al., 2017). The vegetation of the area is categorised under the Dry evergreen Afromontane forest and grassland complex (DAF) (Friis et al., 2010), a nationally threatened habitat. The surrounding areas are characterised by urban areas (Addis Ababa) and agricultural land growing crops such as wheat, barley, and teff (Wube, 2005).

The IPA is composed of a mix of natural forest, plantation (Eucalyptus spp.) forest, and riverine vegetation (Atinafe et al., 2020). A large area of the natural forest has previously been replaced by fast growing timber species, such as Eucalyptus globulus plantations. Efforts have been made within the Gullele Botanic Garden to remove large areas of Eucalyptus globulus where Juniperus procera is regenerating. Juniperus procera was found to be the most frequent woody species within the site, followed by Eucalyptus globulus and Rosa abyssinica R.Br. ex Lindl. (Atinafe et al., 2020). Telake (2009) also noted Hagenia abyssinica (Bruce) J.F.Gmel. as frequent, while Ilex mitis (L.) Radlk. and Apodytes dimidiata E.Mey. ex Arn. are more sparsely populated. Carissa spinarum was found to be the most abundant shrub species (Atinafe et al., 2020). Over 220 plant species, across 66 families have been recorded from Entoto Natural Park, Gullele Botanic Garden, and the associated forest areas (Telake, 2009; Woldegerima et al., 2017; Atinafe et al., 2020).

The Entoto Hills and surrounding areas lie on a large Silicic formation, thought to be formed 21.5 mya (Telake, 2009; Engidasew & Abay, 2016). The lithologies of the Entoto Silicic formation are pale grey to reddish grey trachyte, and rhyolite containing quartz phenocrysts (Telake, 2009; Engidasew & Abay, 2016). Soils are predominantly luvisols; however cambisols and nitisols are known from the surrounding area (Telake, 2009; Jones et al., 2013).

Rainfall is bimodal with a long wet season from July to September and a short wet season from March to May (Telake, 2009). The mean annual rainfall ranges from 1,200-1,400 mm (Ambaw, 2015; Atinafe et al., 2020). The IPA is considered to have a cold climate, with average annual temperatures of ca. 14°C (Telake, 2009; Ambaw, 2015; Atinafe et al., 2020).

Conservation issues

The main threat to Entoto and the surrounding areas is forest loss from the extraction of timber for fuelwood and construction materials (Reeder, 2013; Atinafe et al., 2020). Historically, the natural Dry Afromontane Forest dominated by Juniperus procera was devastated by logging as a result of the increasing human populations (Atinafe et al., 2020). More recently, areas of the Entoto Natural Park and forest have been converted for recreation, including the construction of Zoma Park Village, and the clearing of forest for walking paths (Atinafe et al., 2020; Belachew, 2020).

The city of Addis Ababa was founded by Emperor Menelik II in 1887, this resulted in extensive deforestation of the surrounding areas

including the Entoto mountain chain and Menagesha Forest IPA (Telake, 2009). To alleviate the loss of forest for fuelwood and construction, Emperor Menelik II ordered the planting of the exotic fast-growing timber species, Eucalyptus globulus (Telake, 2009; Atinafe et al., 2020).

The IPA is also at risk from agricultural encroachment and expansion of urban areas (Woldegerima et al., 2017). Removal of timber within the IPA has caused the soils in some areas to become impoverished and vulnerable to erosion (BirdLife, 2021). In addition, Eucalyptus forests are thought to aggravate soil erosion through their sparse understory vegetation and lack of leaf litter (Woldegerima et al., 2017). In an effort to prevent soil erosion and control the water flow within Entoto Natural Park, 200 km of terracing and 15 km of check dams have been built (Ethiopian Heritage Trust, 2021).

In 1995, the Addis Ababa City Administration gave a conservation corner within the Entoto Natural Park to the Ethiopian Heritage Trust on the understanding that the Trust would develop the park for recreational use by the local communities and as a site for visitors (BirdLife, 2021; Ethiopian Heritage Trust, 2021). One of the main aims is to restore the natural forest of the park area; as of 2020 over 600,000 indigenous trees have been planted (Ethiopian Heritage Trust, 2021). Telake (2009) found 827 seedlings and 610 saplings, totalling 1,437 young individuals compared to the 868 mature trees recorded, showing a good regeneration status.

In 2005 a memorandum of understanding was established between Addis Ababa University and the Addis Ababa City Administration to ensure the allocation of 705 ha of land to be developed and managed as the Gullele Botanic Garden (Tadesse, 2011; Gullele Botanic Garden, 2021). As of 2009, the botanic garden occupied 936 ha of land, partly within the Addis Ababa city administration and partly within Oromia Regional State (Telake, 2009; Woldegerima et al., 2017). Since its establishment more than 50,000 people have visited for research, education and leisure (Tadese, 2019).

The Entoto mountain chain and the immediate vicinity are not categorised under a protected area (Protected Planet, 2021). However, approximately 936 ha within the IPA are protected within the Gullele Botanic Garden, and a further 1,300 ha are protected by the Ethiopian Heritage Trust within the Entoto Natural Park. The mountain chain is also jointly managed by the Horn Re-Greening Program (HRGP), the Oromia Forest and Wildlife Enterprise (OFWE), and Oromia Development Association (ODA), with a focus on rehabilitation of degraded areas and reforestation (Tadesse, 2021).

The IPA encompasses the Entoto Natural Park and Escarpment Important Bird Area (IBA) and Key Biodiversity Area (KBA). The site was designated as an IBA in 1996 under criterion A3 based on the occurrence of 33 bird species; however, these are all now classified as Least Concern (LC), with the exception of the Moorland Francolin (Scleroptila psilolaema) which is listed as Near Threatened (NT) under the IUCN Red List (BirdLife, 2021). The KBA designation in 2001 was triggered by the presence of Carex monostachya (VU) and the Ethiopian endemic, Indigofera rothii (then VU, now EN) (Key Biodiversity Areas, 2020), however the presence of these species here is doubtful and further investigation is needed.

Atinafe et al. (2020) proposed the implementation of Participatory Forest Management (PFM) to protect the remaining forest, and the most economically important plant species from local extinction.

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
Gymnosporia addat Loes.	A(i)	✓	✓	✓	–	–	
Chrysojasminum stans (Pax) Banfi	A(i)	✓	✓	✓	–	–	
Hyparrhenia tuberculata Clayton	A(i)	✓	✓	✓	–	–	
Helichrysum hedbergianum Mesfin & T.Reilly	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
Dry Afromontane Forest	C(iii)		–		

General site habitats

GENERAL SITE HABITAT	PERCENT COVERAGE	IMPORTANCE
Forest - Subtropical/Tropical Dry Forest	–	Major
Artificial - Terrestrial - Plantations	–	Major
Wetlands (inland) - Permanent Rivers, Streams, Creeks [includes waterfalls]	–	Minor
Rocky Areas - Rocky Areas [e.g. inland cliffs, mountain peaks]	–	Minor

Land use types

LAND USE TYPE	PERCENT COVERAGE	IMPORTANCE
Nature conservation	–	Major
Forestry	–	Major
Tourism / Recreation	–	Major

Threats

THREAT	SEVERITY	TIMING
Biological resource use - Gathering terrestrial plants - Motivation Unknown/Unrecorded	High	Past, not likely to return
Residential & commercial development - Tourism & recreation areas	Low	Ongoing - increasing
Agriculture & aquaculture - Wood & pulp plantations	Medium	Ongoing - trend unknown

Conservation designation

DESIGNATION NAME	PROTECTED AREA	RELATIONSHIP WITH IPA	AREAL OVERLAP
Entoto Natural Park and Escarpment IBA	Important Bird Area	protected/conservation area overlaps with IPA	–
Entoto Natural Park and Escarpment KBA	Key Biodiversity Area	protected/conservation area overlaps with IPA	–

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