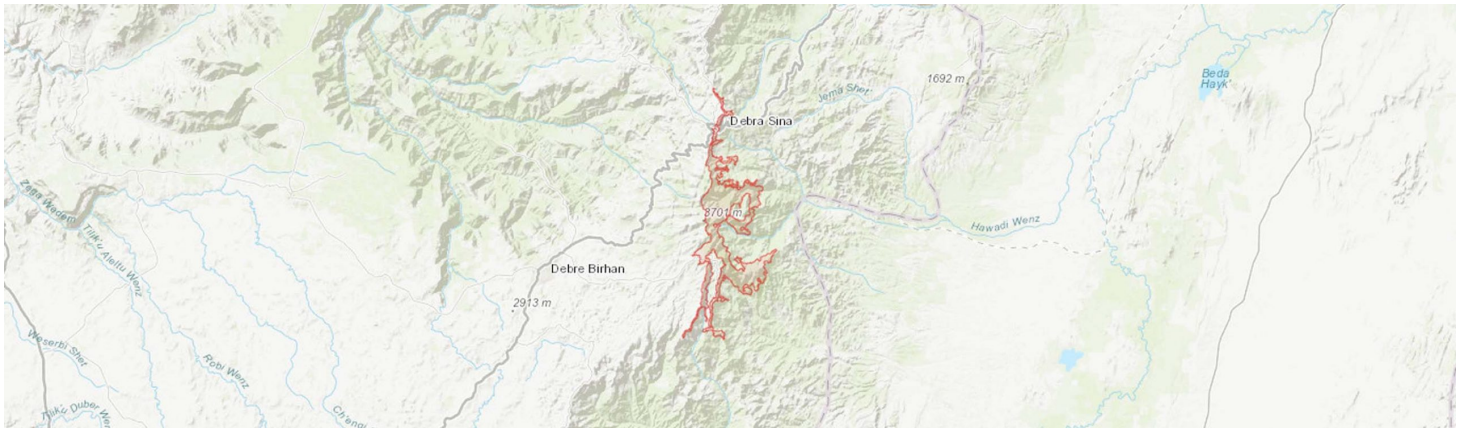


Wof-Washa Forest

ETHTIPA009



Country: **Ethiopia**

Administrative region: **Amhara (Regional State)**

Central co-ordinates: **9.74730 N, 39.75024 E**

Area: **91.3km²**

Qualifying IPA criteria

A(i), C(iii)

IPA assessment rationale

Wof-Washa Forest is one of the most important remnants of the nationally threatened Dry Afromontane Forest, therefore qualifying as an IPA under criterion C(iii), and under criterion A(i) due to the presence of the globally threatened species, *Aloe ankoberensis* (EN), for which this IPA is thought to contain the entire global population.

Also of note is the presence of the widespread but globally threatened timber species *Prunus africana* (VU), and the timber species, *Juniperus procera* (LC, but decreasing globally). These do not trigger IPA status but could in the future.

Site description

Wof-Washa Forest is situated approximately 140-160 km northeast of Addis Ababa and c. 25 km to the west of Debre Birhan, the administration Centre of north Shewa Zone. It is located within the Shewa floristic region in the Amhara Regional State of the Ethiopian Central Highlands. The topology of the IPA is mountainous, dissected by numerous rivers and streams. The IPA is bordered by the towns of Ankober (the former capital of the kingdom of Shewa) to the south and Debra Sina to the north. The main road between Ankober and Debre Birhan runs through the south of the IPA, while the main road between Debre Birhan and Debra Sina runs through

the north of the site.

The IPA is one of the few remaining remnants of the nationally threatened Dry Afromontane Forests in Ethiopia. During the 15th century, Emperor Zera Yakob is said to have ordered the reforestation of Menagesha Forest to the west of Addis Ababa using seeds of *Juniperus procera* Hochst. ex Endl. taken from Wof-Washa Forest (Sebsebe, 1988; Teketay & Bekele, 1995). Wof-Washa is thought to be one of Ethiopia's oldest proclaimed state forest (Spooner, 2014).

Wof-Washa Forest is designated as a National Forest Priority Area (NFPA). The forest comes under the Ankober – Debra Sina Escarpment Important Bird Area (IBA) and Key Biodiversity Area (KBA). The name Wof-Washa means Cave of Birds (Bekele, 1993; Teketay & Bekele, 1995).

Botanical significance

Dry Afromontane Forests were once extensive across the Ethiopian Highlands but have been reduced to remnant fragments due to agricultural expansion, urban sprawl, and population pressures. Wof-Washa Forest is one of the best remaining examples of this nationally threatened habitat in Central Ethiopia, and reportedly the largest remnant in the Amhara Regional State (Tessema et al., 2016; Teshome et al., 2018).

Of particular importance, Wof-Washa Forest and its immediate vicinity is thought to contain the entire global population of the globally threatened *Aloe ankoberensis* M.G. Gilbert & Sebsebe (EN). This species is associated with steep rocky slopes and cliff faces.

Seventeen Ethiopian endemics and seven near endemics have been recorded within the forest according to Teketay & Bekele (1995) and Yirga et al. (2019), updated according to POWO (2021), including the

widely used medicinal plant *Echinops kebericho* Mesfin (NT). Additionally, the Ethiopian endemic *Trifolium pichisermollii* J.B.Gillett (NT), has been recorded just outside the IPA near the town of Ankober.

Also of note is the globally threatened medicinal timber species, *Prunus africana* (Hook.f.) Kalkman (VU), however this IPA is not thought to be a globally important site for this widespread species. The highly economically important tree species, *Juniperus procera* (LC, but decreasing globally) is the dominant species within the forest.

The globally threatened species, *Aloe sinana* Reynolds (EN) has been recorded in the areas surrounding the site and could be present within the IPA. The globally threatened species, *Carex monostachya* A.Rich. (VU) was recorded in the KBA assessment, however this appears to be incorrect. Further investigation is needed.

Habitat and geology

Wof-Washa Forest is one of the few remnant Dry Afromontane Forests in Ethiopia. It is floristically similar to the Menagesha and Chilimo Forest IPAs.

The topology of Wof-Washa Forest is characterised by mountainous terrain with steep slopes and rugged terrain, highly dissected by rivers and streams (Bekele, 1993; Teketay & Bekele, 1995; Goshme & Yihune, 2018). The escarpment on which the forest resides forms part of the Awash river system catchment area (Bekele, 1993). Many of the streams and rivers within the IPA are tributaries of the Awadi river, which is itself the main tributary of the Awash (Teketay & Bekele, 1995). Bekele (1993) describes the slopes of the escarpment as rising abruptly from the surrounding lowlands, which are characterised by arable land and settlements. Land types found within the IPA are forest, shrubland, steep cliffs, and exotic and indigenous plantations.

Wof-Washa Forest is dominated by *Juniperus procera*, *Afrocarpus gracilior* (Pilg.) C.N.Page (formerly *Podocarpus gracilior*), *Erica arborea* L., *Hagenia abyssinica* (Bruce) J.F.Gmel., *Ilex mitis* (L.) Radlk., *Myrsine melanophloeos* (L.) R.Br. ex Sweet, *Euphorbia abyssinica* J.F.Gmel., *Gymnosporia arbutifolia* (Hochst. ex A.Rich.) Loes. (formerly *Maytenus arbutifolia*), *Myrsine africana* L., and *Galuniera saxifraga* (Hochst.) Bridson (Bekele, 1993; Teketay & Bekele, 1995; Fisaha et al., 2013). Teketay & Bekele (1995) recorded 252 plant species across 71 families within the forest.

Above the tree limit, the IPA is characterised by a *Festuca*-grassland with *Thymus schimperii* Ronniger, *Anthemis tigrensis* J.Gay ex A.Rich., *Crepis rueppellii* Sch.Bip., and scattered individuals of the endemic *Lobelia rhynchopetalum* Hemsl. (alt.: 3400 m+) (Teketay & Bekele, 1995). *Juniperus procera*, *Erica arborea*, *Hagenia abyssinica*, and *Rosa abyssinica* R.Br. ex Lindl. dominate the upper elevations of

the forest, while *Afrocarpus gracilior* dominates in the lower elevations (Bekele, 1993; Teketay & Bekele, 1995; Fisaha et al., 2013). Bekele (1993) and Fisaha et al. (2013) recorded an *Afrocarpus* – *Allophylus abyssinicus* community type at lower elevations and in valley bottoms. According to Fisaha et al. (2013) this community type is highly impacted by human disturbance. Indicator species of this community are *Afrocarpus gracilior*, *Allophylus abyssinicus* (Hochst.) Radlk., *Haleria lucida* L., *Rothea myricoides* (Hochst.) Steane & Mabb., *Ficus sur* Forssk., *Pavetta abyssinica* Fresen., *Carissa spinarum* L., and *Debregeasia saeneb* (Forssk.) Hepper & J.R.I.Wood (Fisaha et al., 2013).

The succulent tree *Euphorbia abyssinica* J.F.Gmel. forms a distinct vegetation type found at the edges of the forest (Bekele, 1993; Fisaha et al., 2013). Within this vegetation type, regenerating *Afrocarpus gracilior* trees form a subcanopy (Bekele, 1993). Fisaha et al. (2013) also reported *Pittosporum viridiflorum* Sims, *Polyscias fulva* (Hiern) Harms, *Bersama abyssinica* Fresen., *Croton macrostachyus* Hochst. ex Delile, *Astropanax abyssinicus* (Hochst. ex A.Rich.) Seem. (formerly *Schefflera abyssinica*), *Searsia retinorrhoea* (Steud. ex Oliv.) Moffett, *Ekebergia capensis* Sparrm., and *Celtis africana* Burm.f. as being common within a similar elevation range - several of these are pioneer species of regenerating forest.

A small population of mountain bamboo, *Oldeania alpina* (K.Schum.) Stapleton (formerly *Arundinaria alpina*), persists in Wof-Washa Forest according to Bekele (1993). Recent surveys confirm the continued presence of these bamboo thickets.

The bedrock of the area is Tarmaber basalt, the major rock type of the region (Bekele, 1993). The general lithology of the area is comprised of ferric basalts, fine grained basalts, zeolitized basalts, phonolites, alkali trachytes, trachyphonolites, and rhyolites (Bekele, 1993). Soils are predominantly leptosols and cambisols (Jones et al., 2013). Soils within the forest are generally shallow, and particularly thin on slopes and rocky outcrops (Bekele, 1993; Spooner, 2014).

Rainfall is bimodal with a long wet season running from July to September, and a short wet season between March and May (Fisaha et al., 2013). The mean annual rainfall is ca. 1400 mm (Spooner, 2014; Goshme & Yihune, 2018; Teshome et al., 2018). The minimum mean annual temperature ranges from 10-11°C, whilst the maximum mean annual temperature is 20°C (Bekele, 1993; Spooner, 2014). Cloud and mist persistence is common at higher altitudes of the forest year round (Bekele, 1993), providing an important moisture source.

Conservation issues

Wof-Washa Forest is designated as a National Forest Priority Area (NFPA), managed by the State Forests Conservation and Development Office (Teketay & Bekele, 1995). Teketay & Bekele (1995) reported temporary forest guards and inconsistent payments

resulted in a less rigorous protection of the forest.

The major threats to Wof-Washa Forest include deforestation, fragmentation, and habitat degradation. Population pressure, unsustainable forest use, and an increasing number of livestock are thought to be key factors in the decline of Wof-Washa Forest (Spooner, 2014; Tessema et al., 2016; Tadesse & Teketay, 2017). Tilaun (2012) in Yirga et al. (2019) reported that approximately 300 ha of natural forest had been severely degraded with very few *Juniperus procera* individuals along the forest border and on rocky areas in higher elevations of the forest. The quality of habitat has declined due to overgrazing from livestock and overexploitation from local communities for timber products (Teketay & Bekele, 1995; Spooner, 2014; Goshme & Yihune, 2018). Overgrazing from livestock causes damage to seedlings and sapling and therefore hinders the natural regeneration of the forest; occasionally patches of the forest are cleared to create temporary barns for livestock (Teketay & Bekele, 1995). The forest has also been subjected to progressive encroachment from arable land and settlements (Teketay & Bekele, 1995; Tessema et al., 2016); intensive crop cultivation in the surrounding area has been carried out for centuries (Spooner, 2014).

The shortage of wood in the surrounding areas has put pressure on the use of Wof-Washa Forest (Teketay & Bekele, 1995). Density analysis of woody species by Fisaha et al. (2013) has shown that large-sized trees, such as *Hagenia abyssinica*, are facing higher deforestation rates than shrubs and smaller trees, such as *Myrsine africana*. Teketay & Bekele (1995) reported that the bamboo *Oldeania alpina* was used by the local communities for construction, which had resulted in a decline of that species. Bekele (1993) recorded 109 logs and 47 stumps across 19 (30 x 30 m) plots in Wof-Washa Forest. Unlike the Chilimo and Menagesha IPAs, Wof-Washa has never been logged for commercial use (Bekele, 1993). The remote location, steep slopes, and distance from major roads have contributed to the lack of commercial exploitation (Bekele, 1993; Teketay & Bekele, 1995). However, in addition to making the forest inaccessible, the steep slopes make the IPA susceptible to soil erosion (Bekele, 1993; Tessema et al., 2016). The globally threatened *Aloe ankoberensis* grows on steep cliffs in forested areas and is threatened by erosion resulting from deforestation and overgrazing (Weber & Sebsebe, 2013).

Bekele (1993) described Wof-Washa as a mature forest in comparison to Menagesha and Chilimo Forests, which are thought of as secondary due to historical overexploitation from sawmills since the early 1900s. Teketay & Bekele (1995) observed that *Juniperus procera* had poor regeneration at Wof-Washa, with very few saplings and seedlings recorded. However, *Afrocrapus gracilior*, *Erica arborea* and *Hagenia abyssinica* were found to be regenerating naturally. Regeneration in Wof-Washa Forest is thought to be lower than the Menagesha-Suba Forest IPA, this is likely due to overgrazing (Fisaha et al., 2013).

Major differences in opinion regarding the forest cover of Wof-Washa have been reported over the last eight decades, with forest

cover estimated to be between 2,000 ha and 10,000 ha depending on the source (Bekele, 1993; Teketay & Bekele, 1995; Fisaha et al., 2013; Spooner, 2014; Tessema et al., 2016). These discrepancies in forest cover are likely due to differences of opinion in delimitation rather than forest loss and gain. Additionally, inclusion of indigenous and exotic plantations in some reports could have resulted in larger forest cover. Most recently, Yirga et al. (2019) reported Wof-Washa Forest cover to be 7,550 ha. The Wof-Washa Forest IPA covers ca. 9,133 ha and includes natural forest, high altitude grassland with shrubs, rocky outcrops, and plantations of *Juniperus procera* and *Eucalyptus globulus* Labill.

In the early 2000s an Ethiopian NGO, SUNARMA, established participatory forest management (PFM) in Wof-Washa Forest. The five year project resulted in 93 enterprise groups and 11 forest management cooperatives being established (Tree Aid, 2021). The project aimed to develop sustainable management of the forest and increase income to local communities. Eucalyptus plantations were developed to relieve the pressure of timber products from the natural forest (Action Ethiopia, 2018). Tessema et al. (2016) reported that approximately 6,260 ha of forest was handed over to the forest management cooperatives in 2017. Tadesse & Teketay (2017) found that generally there was a positive attitude towards PFM from local communities, however awareness of PFM and local involvement in decision making should be increased.

The Regional Office of State Forests Conservation and Development established a tree nursery within Wof-Washa Forest to support reforestation and afforestation (Teketay & Bekele, 1995). The nursery has the capacity to hold 500,000 *Juniperus procera* seedlings (Teketay & Bekele, 1995). This nursery was later managed by SUNARMA before eventually being handed over to the Ethiopian REDD+ initiative under the Commission for Forest and Climate Change (Spooner, 2014; Ermias Lulekal pers. comm., 2021).

The IPA overlaps with the Ankober – Debre Sina Escarpment Important Bird Area (IBA) and Key Biodiversity Area (KBA), which supports the only known population of the endemic Ankober Serin (*Crithagra ankoberensis*, VU) (BirdLife, 2021a). The Ankober – Debre Sina Escarpment IBA was designated in 1996 under criteria A1, A2, and A3 based on the occurrence of 24 bird species (BirdLife, 2021a). Two are currently categorised as Vulnerable (VU) under the IUCN Red List: Blue-winged Goose (*Cyanochen cyanoptera*) and Ankober Serin (*Crithagra ankoberensis*), and two are Near Threatened (NT), Moorland Francolin (*Scleroptila psilolaema*) and Abyssinian Longclaw (*Macronyx flavicollis*) (BirdLife, 2021a). The Ankober – Debre Sina Escarpment KBA was last assessed in 2011 as vulnerable due to the presence of Ankober Serin (*Crithagra ankoberensis*, VU), Ruppell's Chat (*Myrmecocichla melaena*, LC), Egyptian Vulture (*Neophron percnopterus*, VU now EN), and *Carex monostachya* (VU) (Key Biodiversity Areas, 2020). The reported presence of *Carex monostachya* in Wof-Washa Forest requires further investigation, but is considered to be in error.

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 |
|--|--------------------------|---------------------------|-----------------------------|------------------------------|--------------------------|------------------------------|-------------------|
| <i>Prunus africana</i> (Hook.f.) Kalkman | A(i) | — | — | — | — | — | |
| <i>Aloe ankoberensis</i> M.G.Gilbert & Sebsebe | 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) | | | | 8800 |

General site habitats

| GENERAL SITE HABITAT | PERCENT COVERAGE | IMPORTANCE |
|---|------------------|------------|
| Forest - Subtropical/Tropical Moist Montane Forest | — | Major |
| Rocky Areas - Rocky Areas [e.g. inland cliffs, mountain peaks] | — | Major |
| Shrubland - Subtropical/Tropical High Altitude Shrubland | — | Minor |
| Wetlands (inland) - Permanent Rivers, Streams, Creeks [includes waterfalls] | — | Minor |
| Artificial - Terrestrial - Plantations | — | Major |
| Artificial - Terrestrial - Arable Land | — | Minor |
| Artificial - Terrestrial - Pastureland | — | Minor |
| Grassland - Subtropical/Tropical High Altitude Grassland | — | Minor |

Land use types

| LAND USE TYPE | PERCENT COVERAGE | IMPORTANCE |
|------------------------------|------------------|------------|
| Nature conservation | — | Major |
| Agriculture (arable) | — | Minor |
| Agriculture (pastoral) | — | Unknown |
| Tourism / Recreation | — | Minor |
| Forestry | — | Major |
| Harvesting of wild resources | — | Major |

Threats

| THREAT | SEVERITY | TIMING |
|--|----------|-------------------------|
| Agriculture & aquaculture - Livestock farming & ranching - Scale Unknown/Unrecorded | High | Ongoing - trend unknown |
| Agriculture & aquaculture - Annual & perennial non-timber crops - Small-holder farming | High | Ongoing - trend unknown |
| Residential & commercial development - Housing & urban areas | Medium | Ongoing - trend unknown |
| Biological resource use - Logging & wood harvesting | High | Ongoing - trend unknown |

Protected areas

| PROTECTED AREA NAME | PROTECTED AREA TYPE | RELATIONSHIP WITH IPA | AREAL OVERLAP |
|---|-------------------------------|---|---------------|
| Wof-Washa National Forest Priority Area | National Forest Priority Area | protected/conservation area overlaps with IPA | — |

Conservation designation

| DESIGNATION NAME | PROTECTED AREA | RELATIONSHIP WITH IPA | AREAL OVERLAP |
|-----------------------------------|-----------------------|---|---------------|
| Ankober-Debre Sina Escarpment IBA | Important Bird Area | protected/conservation area overlaps with IPA | — |
| Ankober-Debre Sina Escarpment KBA | Key Biodiversity Area | protected/conservation area overlaps with IPA | — |

Management type

| MANAGEMENT TYPE | DESCRIPTION | YEAR STARTED | YEAR FINISHED |
|--|--|--------------|---------------|
| Sustainable Forestry management in place | Eleven forest management cooperatives, established by SUNARMA, sustainably manage ca. 6,262 ha of forest within the IPA (Tessema et al., 2016). This participatory Forest Management (PFM) aims to maintain the natural forest, increase forest cover by reforestation and afforestation, and establish Eucalyptus plantations to relieve pressure from the natural forest (Action Ethiopia, 2018). The PFM plan prepared by the forest cooperatives and the Amhara National Regional State Forest Enterprise has four main sections: 1) forest development, 2) forest protection, 3) sustainable forest utilisation, and 4) forest follow up and monitoring (Tessema et al., 2016). | — | — |

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