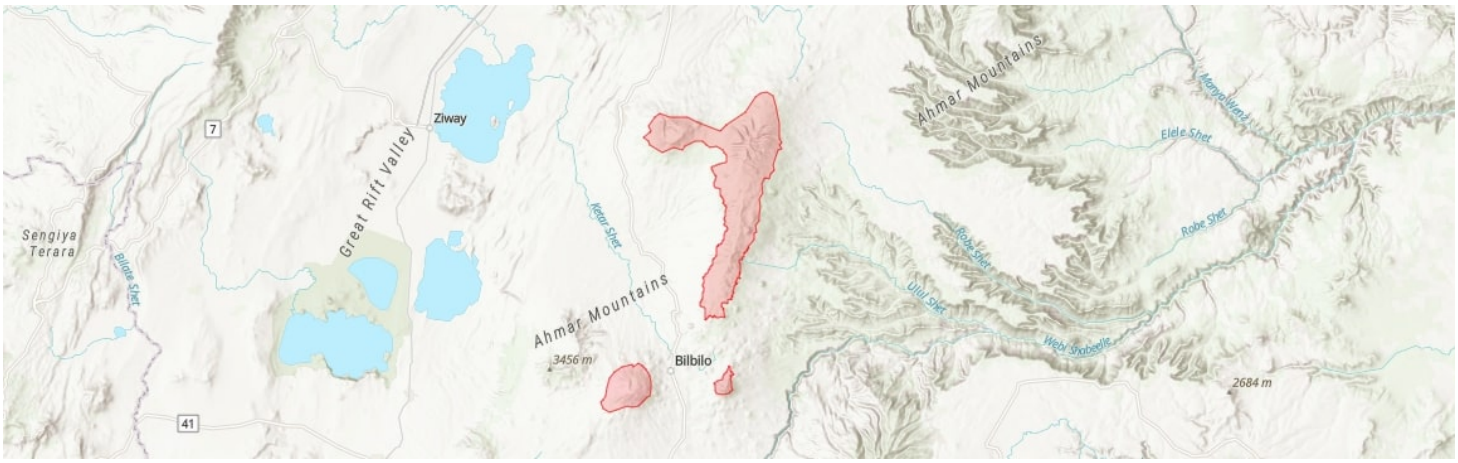
Arsi Mountains

ETHTIPA018



Country: **Ethiopia**
Administrative region: **Oromia (Regional State)**
Central co-ordinates: **7.72000 N, 39.27000 E**
Area: **709km²**

Qualifying IPA criteria

A(i), C(iii)

IPA assessment rationale

The Simen mountains qualify as an IPA under criteria A and C. The presence of thirteen threatened endemic species: Anthoxanthum aethiopicum (EN), Asplenium baleens (VU), Callitriche favargera (VU), Disperis galerita (VU), Disperis meirax (EN), Echinops ellenbeckii (VU), Habenaria decumbens (EN), Helichrysum harennense (EN), Helichrysum hedbergianum (VU), Lobelia rhynchopetalum (CR), Poa hedbergii (VU), Sedum epidendrum (VU) and Senecio balensis (EN) trigger criterion A(i). Additionally, criterion C(iii) is triggered by the presence of a severely declined vegetation type within the IPA, Afroalpine vegetation, for which the Arsi Mountains is one of the most intact remaining examples.

Site description

The Arsi Mountains IPA is located in the highlands of the central rift valley of Ethiopia, in the Arsi and West Arsi Zones of the Oromia Regional State. It is located ca. 200 km southeast of Addis Ababa and 15 km from the town of Asella. This site contains the second largest expanse of Afroalpine vegetation in Ethiopia. The IPA consists of three disjunct polygons of remnant alpine vegetation, the largest being the Chilalo-Galama Range, then Kecha (also referred to as Kaka) to the southwest, and Enkolo (also referred to as Encuolo, Hunkolo) to the southeast. The IPA reaches its peak at Mount Bada (4173 m), followed by Mount Chilalo (4081 m), Kecha (4073 m) and Enkolo (3803 m).The northern slopes of the Galama Range drain towards the Awash River, while the southern slopes are the source of the headwater streams of the Wabi Shebelle River. Additionally, some of the major Rift Valley lakes such as Lake Ziway are fed by tributaries from the Arsi Mountains.
This boundary of this IPA largely overlaps with the Arsi Mountains National Park, however modifications to exclude encroachment of agriculture and mixed forestry plantations have been made. The other disjunct patch of the Arsi Mountains NP, Dera Dilfaqar, has not included in this IPA as it is a different vegetation community and there are no records of priority plant species to support its assessment.

Botanical significance

The Arsi Mountains IPA falls within the Eastern Afromontane biodiversity hotspot. This IPA is one of the most intact remaining intact examples of alpine vegetation, 97% of which has been lost in Ethiopia (UNESCO, 2020). Afroalpine flora harbors unique taxonomic and genetic diversity that is particularly fragile (Brochmann et al., 2022) and this site is globally important for 27 endemic and 13 threatened (1 CR, 5 EN, 7 VU) plant taxa. A study of the botany of the Arsi Mountains also recorded the presence of two further threatened endemic grasses, Festuca gilbertiana (EN) and Festuca macrophylla (VU) (Girma et al., 2018),); however, as these records could not be verified by herbarium specimens they have not been included in this assessment.
Of particular note, this site is critical habitat for the charismatic Afroalpine species Lobelia rhynchopetalum (CR) as one of the four remaining locations for this species. Under future climate scenarios, a range reduction of 87% in the Bale-Arsi region is predicted by 2080 for this species, therefore all remaining Afroalpine habitat is vital for

its persistence (Chala et al., 2016). Additionally this IPA is important habitat for several endangered terrestrial orchids. This site is one of two known locations for Disperis mierax (EN) which has not been collected in over 50 years, as well as one of 4 locations for Habenaria decumbens (EN) which has not been recorded at the site in over 100 years. Targeted surveys are urgently needed to confirm the continued presence and current status of these orchid species. Of the three polygons that constitute this IPA, the Chilamo/Galama Mountains are the most extensively studied botanically. This IPA has a floristic affinity to the nearby Bale Mountains IPA, sharing critical habitat for six endemic threatened species, two of which are only shared between the two sites, namely Callitriche favargera (VU) and Poa hedbergii (EN).

Habitat and geology

The Arsi Mountains IPA is characterized by Afroalpine vegetation (Friis et al., 2010). The slopes surrounding these peaks have been highly modified, with most of the Ericaceous scrub and Dry Afromontane Forest vegetation that once connected the three polygons of this site now only extant in isolated patches within the IPA.

The Afroalpine grassland communities at the site have scattered shrubs such as Helichrysum and Alchemilla, as well as tussock grass species, with stands of the charismatic endemic giant lobelia, Lobelia rhynchopetalum (Girma et al., 2018). There are some small, fragmented patches of Dry evergreen Afromontane vegetation (DAF) occupying lower-elevation areas of the IPA (2,500–3,000 m). DAF is dominated by tree species such as Afrocarpus gracilior, Juniperus procera, and Hagenia abyssinica (Girma et al., 2018). Ericaceous Belt shrubland (EB) is also scattered in the subalpine zone (3,000–3,500 m) and is dominated by Erica arborea and Erica trimera.

The geology of the Arsi Mountains is volcanic in origin, and there is some evidence of past glaciation at the site (Ulmer, 2004). Mt Chilamo, Mt Kecha and Mt Enkolo are volcanic calderas. The soil type varies throughout the site, from pellic vertisols in lower elevations to eutric nitosols on the mountain summits (Girma et al., 2018).

The area is characterized by a humid montane climate with a bimodal rainfall pattern. The mean annual rainfall ranges from 778–1,090 mm (ENMA, 2015).

Conservation issues

The Ethiopian highlands have a long history of human settlement and interaction, and this site continues to be subject to intense anthropogenic pressures. Despite formal protection as a National Park, activities such as clearing, grazing and wood collection have altered vegetation composition and structure in the Arsi Mountains. Satellite imagery suggests that since the designation of the Arsi Mountains National Park (NP) in 2011, the park boundary has gradually been encroached upon and converted to agricultural land (Google Earth, 2024). Agricultural lands surround the IPA, with remnant natural habitat occurring mostly on steep slopes and alpine zones above ca. 3,000 m where cultivation is less feasible. These areas of remnant vegetation are further threatened by intense grazing pressure (Girma et al. 2018). A study at the site revealed that stocking rates exceed the sustainable carrying capacity recommended for highland areas and are currently at 4x the recommended density (Abdulahi, 2023). Overstocking has had a demonstrable impact on vegetation at the site, with rare species absent from overgrazed plots (Girma et al., 2018). Ericaceous belt shrubland and Dry Afromontane Forest (DAF) vegetation is further threatened by logging for fuelwood and fires set for fresh pasture (Girma et al. 2018). The rate of tree removal exceeds the rate of regeneration in the DAF present at this IPA. Dominant tree species at the lower elevations have been found to be overharvested (Girma et al., 2018). While some mixed plantations of Eucalyptus spp. occur in the vicinity, presenting alternative means of obtaining wood resources, these plantations have encroached on remnant forest. Based on the current trends of anthropogenic pressures in the study area, species diversity and abundance is predicted to diminish over time (Girma et al., 2018; Mekasha et al., 2023). Urgent conservation measures including control of tree harvesting and livestock encroachment should be prioritized in Arsi Mountains National Park.

Climate change poses a serious future threat to this IPA. Alpine areas are among the environments most likely to be impacted by climate change as mountaintop specialist species are already at the edge of their climactic envelopes. The predicted response of tropical highland grassland species within the Arsi Mountains in Ethiopia has been modelled under no-migration and with-migration scenarios to the projected 4.2 C increase of temperature by 2090 (Mekasha et al., 2013). For 67 species of grasses and legumes, it was determined that the projected warming significantly reduced altitudinal ranges and habitat areas for all the species studied (Mekasha et al., 2013). An additional 42 species (representing 63% of the data set) are predicted to lose their entire current range and habitat area, hence these species are predicted to face local extinctions (Mekasha et al., 2013). As climate warms, it is predicted that Alpine areas will become more suitable for cultivation and more susceptible to fire, further compounding threats to this IPA. Careful in-situ management and monitoring of threatened species is critical.

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
Asplenium balense Chaerle & Viane	A(i)	✓	✓	✓	–	–	Occasional
Disperis galerita Rchb.f.	A(i)	✓	✓	–	–	–	Unknown
Disperis meirax Rchb.f.	A(i)	✓	✓	✓	–	–	Unknown
Echinops ellenbeckii O.Hoffm.	A(i)	✓	✓	–	–	–	Unknown
Habenaria decumbens S.Thomas & P.J.Cribb	A(i)	✓	✓	✓	–	–	Unknown
Helichrysum harennense Mesfin	A(i)	✓	✓	✓	–	–	Unknown
Helichrysum hedbergianum Mesfin & T.Reilly	A(i)	✓	✓	–	–	–	Unknown
Lobelia rhynchopetalum (Hochst. ex A.Rich.) Hemsl.	A(i)	✓	✓	✓	–	–	Unknown
Poa hedbergii S.M.Phillips	A(i)	✓	✓	✓	–	–	Unknown
Sedum epidendrum Hochst. ex A.Rich.	A(i)	✓	✓	–	–	–	Unknown
Senecio balensis S.Ortíz & Vivero	A(i)	✓	✓	–	–	–	Unknown
Eriocaulon aethiopicum S.M.Phillips	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
Afroalpine grassland	C(iii)				

General site habitats

GENERAL SITE HABITAT	PERCENT COVERAGE	IMPORTANCE
Grassland - Subtropical/Tropical High Altitude Grassland	—	Major
Shrubland - Subtropical/Tropical High Altitude Shrubland	—	Minor
Wetlands (inland) - Permanent Freshwater Marshes/Pools [under 8 ha]	—	Minor
Rocky Areas - Rocky Areas [e.g. inland cliffs, mountain peaks]	—	Minor
Forest - Subtropical/Tropical Moist Montane Forest	—	Minor

Land use types

LAND USE TYPE	PERCENT COVERAGE	IMPORTANCE
Nature conservation	—	Major
Agriculture (pastoral)	—	Major
Harvesting of wild resources	—	Minor

Threats

THREAT	SEVERITY	TIMING
Residential & commercial development	Medium	Ongoing - increasing
Agriculture & aquaculture - Annual & perennial non-timber crops - Small-holder farming	High	Ongoing - increasing
Agriculture & aquaculture - Wood & pulp plantations	Medium	Ongoing - increasing
Agriculture & aquaculture - Livestock farming & ranching	High	Ongoing - increasing
Biological resource use - Logging & wood harvesting - Intentional use: subsistence/small scale (species being assessed is the target) [harvest]	High	Ongoing - increasing
Climate change & severe weather	High	Ongoing - increasing
Biological resource use - Gathering terrestrial plants	Medium	Ongoing - trend unknown

Protected areas

PROTECTED AREA NAME	PROTECTED AREA TYPE	RELATIONSHIP WITH IPA	AREAL OVERLAP
Arsi Mountains	National Park	protected/conservation area encompasses IPA	—

Conservation designation

DESIGNATION NAME	PROTECTED AREA	RELATIONSHIP WITH IPA	AREAL OVERLAP
Koffole	Key Biodiversity Area	protected/conservation area encompasses IPA	—

DESIGNATION NAME	PROTECTED AREA	RELATIONSHIP WITH IPA	AREAL OVERLAP

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