

Rehabilitation of afro-montane forest Biodiversity in Ethiopia - potentials and challenges

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Ethiopia - Background information

Land area: 1.1 million km²

Population: 77 million (2008)

Annual growth rate: 2.6%

Rural population: 85-87%

HDI ranking: 171/182 (UNDP 2009)

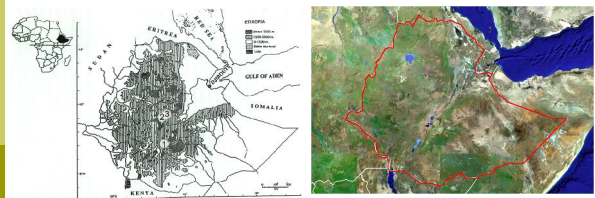
Forest cover: 4.3% in 2000 (Mayaux et al. 2004)

Physical geography: 110m b.s.l - 4620m a.s.l

~44% land area above 1500m

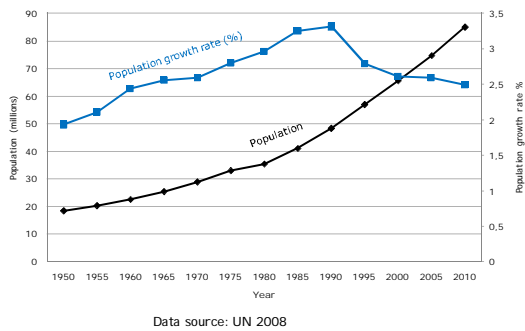
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Map of Ethiopia



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Total population and growth rate, Ethiopia



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Biodiversity resources - flora

- Ethiopia is an important regional centre of biological diversity
- The wide range in altitude and climate as well as isolation of the highlands of Ethiopia are the reasons for high diversity
- It is estimated that there are 6500-7000 higher plant species in the country

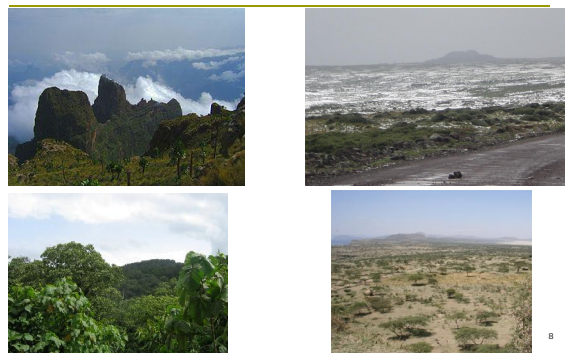
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Biodiversity resources - flora

- The fifth largest flora in Africa
- About 10-12 % are endemic (~1150 plant species)
- Ethiopian highlands constitute more than 50% the area of afro-montane forests

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Biodiversity resources - flora



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Biodiversity resources - flora

Eastern afro-montane forests are recognised as a **hotspot** for biodiversity conservation because of the exceptionally high concentration of **endemic species** and **habitat loss** (Gole et al. 2005).

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Endemic plants of Ethiopia

Lobelia rhychopetalum

Milletia ferruginea



Source: http://homepage.univie.ac.at/~puftt-9/semien2_pics1.htm

Source: Tadesse M. 1995

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Endemic plants of Ethiopia

Acacia abyssinica subsp. *abyssinica*

Disa facula (Orchidaceae)



Source: www.panoramio.com/photo/3201863

Source: IBC 2005

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Recently found species : *Acacia fumosa*



Source: <http://www.ethiopianreview.com/news/5263> (in 2009)

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Biodiversity resources – cultivated crops

- Ethiopia is one of the 12 centres of origin (Vavilov centres) of cultivated crops (EPA 1997).
- There are 11 cultivated crops, which have their centre of diversity in Ethiopia (EWNHS 1996).
- The farmers of Ethiopia have been **generating** and **maintaining** the diversity of crop plants.

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Biodiversity resources – cultivated crops

- *Coffea arabica* - Coffee
- *Eragrostis tef* - Tef
- *Ensete ventriculatum* - Ensete
- *Coccinia abyssinica* - Anchote
- *Guizotia abyssinica* - Niger seed (Nug)
- *Brassica carinata* - Ethiopian rape (Gomenzer)
- *Carthamus tinctorius* - Safflower (suf)
- *Sorghum Spp.* - Sorghum
- *Hordeum Spp.* - Barley
- *Linum usitatissimum* - Linseed (Telba)
- *Ricinus communis* - Castor bean (Gulo)

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Biodiversity resources – forage plants

- Ethiopia is also an important centre of genetic diversity of forage plants. About **46** legumes are endemic (EFAP 1993).

Herbaceous legume species

- *Trifolium* spp. - 10 species are endemic
- *Vigna* spp.
- *Lablab* spp.

(Source: IBC 2005)

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Biodiversity resources – fauna

- Ethiopia encompasses a broad range of ecosystems and habitats contributing for the occurrence of high faunal diversity.
- Ethiopia has one of the richest **avifauna** in mainland Africa (IBC 2005).

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Biodiversity resources – fauna

Group	Orders	Families	Genera	Species	Endemic
Mammals	13	45	144	260	22
Birds	21	84	306	845	27
Reptiles	-	6	36	78	3
Amphibian	-	7	19	54	17
Fish	5	14	33	101	4

Source: EWNHS 1996

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Endemic animals of Ethiopia

Walia Ibex (*Capra walie*)

Simien fox (*Canis simensis*)



Source: [flickr.com/photos/7702396@N05/2289035044](https://www.flickr.com/photos/7702396@N05/2289035044)

Source: ethiopltravelagent.com/bale-mountains.html

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Endemic animals of Ethiopia

Mountain Nyala (*Tragelaphus buxtoni*)

YELLOW-FRONTED PARROT
(*Poicephalus flavifrons*)



Source: brightethiopiatur.com/itineraries/national.htm

Source: <http://www.salamta.net/birds.htm>

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Degradation and loss of biodiversity resources in Ethiopia

- About 87% of the highlands might have had forest cover, reduced to 40% by 1950 and 5,6% by 1980 (Sayer et al. 1992)
- There has been local extinction of species
- The viability of fragmented, small populations of remnant forests is doubtful.

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Degradation and loss of biodiversity resources in Ethiopia

Direct Causes

- ▣ Conversion of forests, woodlands and savannas to agricultural lands (for cultivation and grazing) and other land use systems
- ▣ Fuelwood collection and illegal logging
- ▣ Over-grazing (loss of forage and woody species)
- ▣ Introduction of improved crop varieties
- ▣ Over-hunting (poaching)
- ▣ Alien invasive species

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Degradation and loss of biodiversity resources in Ethiopia

Indirect causes

- ▣ High population growth
- ▣ Ambiguous and insecure land tenure system
- ▣ Undervaluation of the biodiversity resources
- ▣ Legal and institutional systems that promote unsustainable exploitation
- ▣ Lack of incentives for local communities to conserve
- ▣ Disregard to traditional communal (range) land management systems

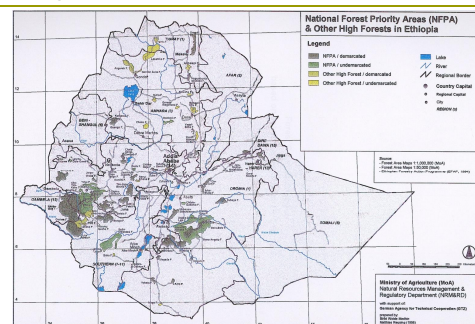
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Rehabilitation of the biodiversity resources

The first step in rehabilitation is usually to **prevent further damage**. In this respect, the protection and conservation of the 58 National Forest Priority Areas is of paramount importance.

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Rehabilitation of the biodiversity resources – ecological aspect



Source: Reusing 1998

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Rehabilitation of the biodiversity resources – ecological aspect

- Accelerate recovery by **enrichment planting** of target species in degraded remnant forests
- Establishment of **corridors** may enhance **biodiversity** and eventually the **viability** of fragmented forests particularly in the central and northern highlands.
- Establishment of **buffer zones** (with tree planting) to stop further degradation of isolated forest fragments may be necessary.

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Rehabilitation of the biodiversity resources – ecological aspect

- **Afforestation** and/or **reforestation** by native woody species may be necessary on sites devoid of vegetation (e.g. steep slopes)
- On highly degraded sites establishment of tree plantations, which can serve as **nurse crops** should be considered
- **Area enclosures** may be necessary to enhance natural regeneration and diversity of the native flora, particularly in arid and semi-arid regions

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Rehabilitation of the biodiversity resources – ecological aspect

- Agroforestry functions as a *circa situm* type of conservation and may also reduce the pressure towards forest resources
- In areas infested with alien invasive species, control or eradication (whenever possible) using integrated pest management may be implemented.

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Agroforestry and *circa situm* biodiversity conservation



Agroforestry practice in Gedeo, Ethiopia (Source: Mesele 2008)

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Rehabilitation of the biodiversity resources – socioeconomic aspect

- There should be meaningful participation by **stakeholders**, including in **decision making** and **implementation**
- It is necessary to consider local socioeconomic needs in choices of approaches and options
- **Equitable** accrual of economic benefits from rehabilitation

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Rehabilitation of the biodiversity resources – socioeconomic aspect

- It is necessary to strengthen local organisations
- Secure land and tree tenure is essential
- Formulation of policies that promote sustainable utilisation and conservation of biodiversity.

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