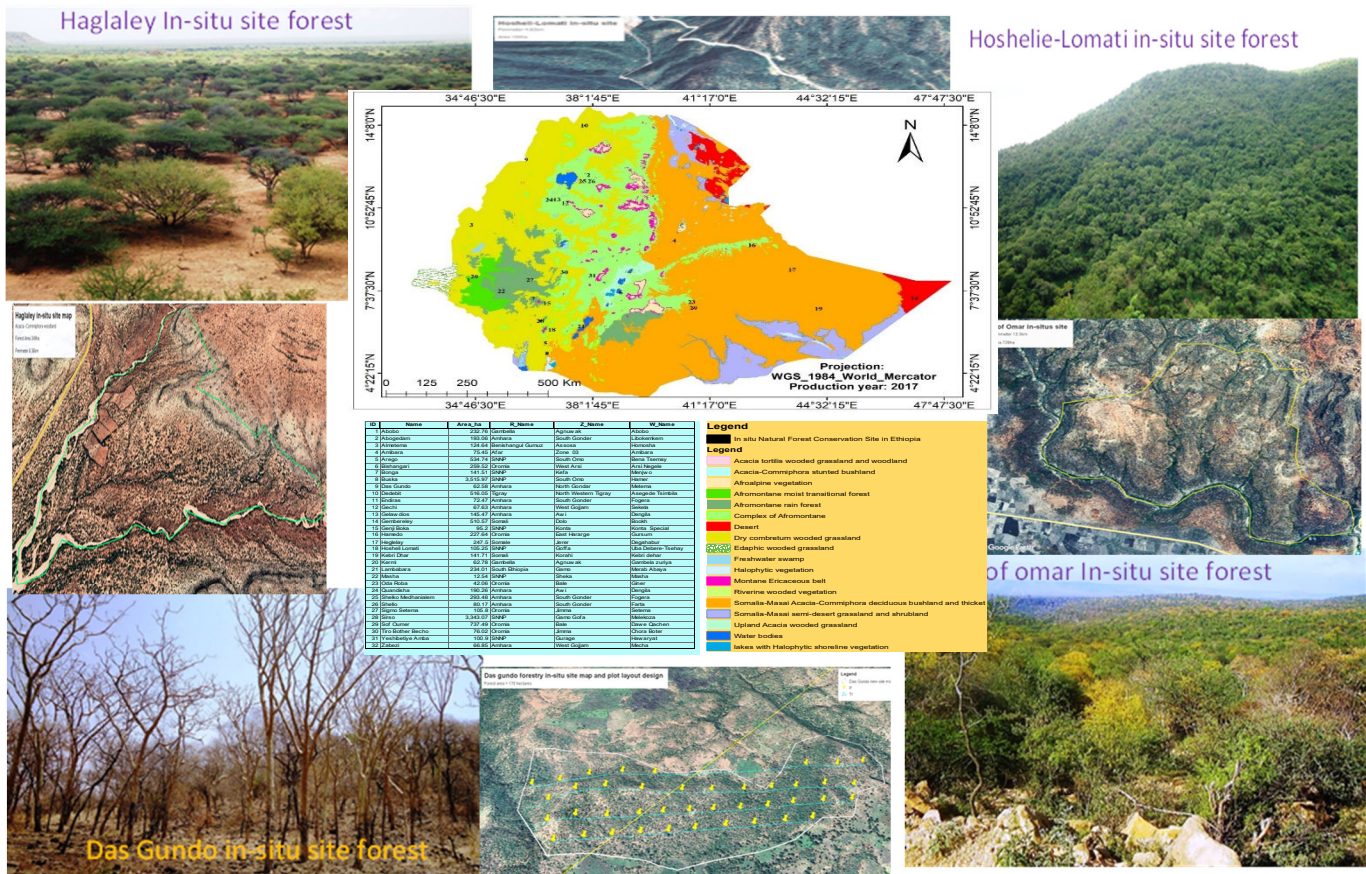




ETHIOPIAN BIODIVERSITY INSTITUTE

FOREST AND RANGE LAND PLANTS BIODIVERSITY RESEARCH

LEAD EXECUTIVE



RESEARCH AND CONSERVATION MILESTONES

APRIL 2025, ADDIS ABABA

Summary

Forests and range lands are home to several living forms including plants, animals, and microorganisms. The interrelationship between these living forms is essential for maintaining the health and balance of the ecosystem. Ethiopia has diverse forest and range land biodiversity resources which are distributed in various vegetation-based ecosystems. Many forest and rangeland plants provide ecosystem goods (food, medicine, fuel wood, construction materials) and services (water, climate regulation etc).

Despite their immense roles, these resources are threatened due to anthropogenic and natural factors. The Ethiopian Biodiversity (EBI) is generally mandated to ensure the conservation, sustainable use and benefit sharing of the country's biodiversity in collaboration with national and international collaborators and stakeholders. Within the institute, the Forest and Range land Plant Biodiversity Research Lead Executive has been established to look after the conservation, sustainable use and benefit sharing of forest and range land plant resources. The organizational structure of the Research Lead Executive comprised of five desks namely, Forest gene bank (Cold storage) and Herbarium desk, Forest biodiversity desk, Rangeland biodiversity desk, Biosphere Reserve desk and Medicinal plant desk. These desks strive to conduct research, exploration, collection, capacity building and awareness raising activities to ensure the conservation and sustainable use of forest and range land plant biodiversity. Accordingly, remarkable achievements have been registered by the Research Lead Executive.

Nearly since the last two decades, the forest and rangeland plant Research Lead Executive has been actively engaging in the conservation of indigenous/native forest species, forage and medicinal plants by employing different methods, *e.i:* *in-situ* conservation where the populations of forest tree and range land plant species in the communities are conserved at their natural habitat, *ex-situ* conservation where the forest tree and range land plant species and their accessions are conserved outside their natural habits in field gene banks, in cold storage gene banks and in botanical gardens; and undertaken phenotypical and biochemical characterization of forage plants.

The research lead executive has recently begun coordinating the UNESCO-MAB program in Ethiopia, which ensures the three functions of biosphere reserves: conservation, development, and logistics.

In connection with *in-situ* conservation, a total of 32 conservation sites representing various ecosystems were established and maintained in collaboration with stakeholders and local communities. Furthermore, as an *in-situ* model, five Biosphere reserves namely, Majang Forest Biosphere Reserve, Kafa Coffee Biosphere Reserve, Yayo Coffee Forest Biosphere Reserve, Sheka Forest Biosphere Reserve and Lake Tana Biosphere Reserve were designated and registered as UNESCO-MAB program

The importance of integrating *in-situ* and *ex-situ* conservation approaches has long been recognized. The later has long been considered as complementary strategy to *in-situ* to plant conservation. *Ex-situ* conservation involves the conservation of species outside their natural habitat example in botanical gardens, gene banks (cold store and field gene banks). *Ex situ* collection and storage of seeds is the most convenient and widely used method of genetic conservation. *Ex-situ* conservation has several roles/purposes: rescue of threatened germplasm, produce material for reintroduction/restoration, research education and visit.

Furthermore, the Research Lead Executive has also been relentlessly engaging in assessment, characterization and research activities with the aim of bridging the gap in knowledge related to the conservation and sustainable use of forest and range land plant biodiversity. So far, several research results have been published in reputable journals, proceedings and avail in the website of the Ethiopian biodiversity Institute.

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1. Introduction

Forest and rangeland habitats have immense economic, cultural, and conservation importance. They are home to vast plant, animal and microbial biodiversity. These resources are the source of livelihoods for many rural communities living adjacent to forest and range land habitats. They provide invaluable ecosystem goods (food, medicine, fuel wood, construction materials) and services (water, climate regulation etc) for the rural and low-income human populations. In Ethiopia, the forest and range lands are found in different parts of the country. They range from lowland dry forest to ever green montane forest vegetation and from lowland grass land to highland grass land vegetation. The montane forest and highland grass land ecosystems have experienced long history of small-scale farming. As a result, there has been progressive soil erosion, forest and land degradation. The lowland grassland and dry forest habitats on the other hand, has faced large and scale farming in recent decades and resulted in shrinkage of forest and rangeland habitats and associated species.

In light of the increasing rate of deforestation, various conservation efforts have been undertaken by the government, non-governmental organizations (NGOs) and private sectors. These include participatory forest management (PFM), management of existing protected areas, establishment of new protected areas, area closures, biosphere reserves, *in-situ* and *ex-situ* conservation sites. The various government strategies and initiatives namely, the Climate-Resilient Green Economy (CRGE) and green legacy Initiative are among opportunities for recovery and conservation of forest and rangeland plant resources.

Being the focal institution to the Convention on Biological Diversity (CBD), the Ethiopian Biodiversity in general and forest and Range Land Research Lead Executive, has made a pivotal role in *in-situ* and *ex-situ* conservation of forest and range land plant biodiversity and gained tremendous achievements. Details of achievements are described below.

2. Major Achievements

The major activities and achievements in each conservation approach are described below.

2.1 *Ex-situ* Conservation

2.1.1 *Gene banking/cold store/*

The forest gene bank was established with the primary objectives of preservation/conservation of germplasms and herbarium specimens of forest, medicinal and forage plants by collecting from various ecosystems of the country and conserving them under *ex-situ* and herbarium facilities, respectively. Besides, distribution of forest seeds to users and provision of other gene bank and herbarium services to customers are part of the major activities.

Seed storage is the preservation of seeds under controlled environmental conditions that maintain seed viability for long periods. Storing/preserving seeds in gene bank are widely used and most convenient method of *ex situ* conservation. Seeds are conserved in the cold storage following international gene bank standards. Much is unknown about the optimum treatment of the seeds of most forest and range land plant species. Thus, before storage, the species' storage behavior should be studied and determined to determine whether the seeds orthodox or recalcitrant. Orthodox seeds can withstand desiccation to low moisture content and storage at very low temperatures while recalcitrant seeds do not survive desiccation and cannot tolerate low temperatures. Many forage species, and many tree, shrub species, produce orthodox seeds which can be stored in gene banks. The requirements for orthodox seed storage include adequate drying; appropriate storage temperature; and careful production of quality seed to ensure the greatest longevity. On the other hand, it is not easy to store recalcitrant seed in gene bank; rather they are conserved under *ex-situ* condition in field gene banks and botanical gardens.

The seeds are in short- and long- term storage/conservation: those seed samples for long-term storage are known as base collections and those seed samples for immediate use are known as active collections. The gene bank storage/conservation activities include field seed collection, seed processing, seed drying, and germination/viability testing processes, and seed storage behavior studies. The conserved seeds are distributed to customers, research institution and development partners for conservation/restoration, research and development purposes. Further, the gene bank provides services to visitors including students from different schools and universities.



Figure 1. A) Seed drying B) Seed viability testing and C) Gene bank storage/preservation

To date, a total 3644 accessions of 450 species were conserved in cold gene bank, of which, 1534, 747 and 1363 are forest forage and medicinal plant species, respectively. In this year alone, 120 accessions of 60 species forest, forage, and medicinal plant species were collected and conserved in cold store gene bank.

2.1.2. Field Gene Banks

Field gene bank is one of the techniques for plant genetic conservation. Field gene bank is an *ex-situ* method where species are maintained away from their natural habitat. It is usually used when there are no available alternatives. In field gene banks the plant genetic resources are kept as live plants that undergo continuous growth and require continuous maintenance. Field gene banks provide an easy and ready access to the plant genetic resources, for characterization, evaluation and utilization. They are also useful for conserving recalcitrant seeds (seeds that cannot be conserved in cold storage) and vegetatively propagated species. The objectives of field gene banks are to maintain healthy, vigorous plants and to minimize risk of loss or genetic change.

The Forest and Range Land Research Lead Executive has also been conserving forest, forage and medicinal plant species in field gene banks. These gene banks were established in different ecosystems to maintain lowland, midland and highland species. To date, a total of 21 field gene banks were established to maintain forest, forage and medicinal plant species. In these gene banks, a total of 800 plant species are conserved and maintained (Table 1). Of these, 190 are forest tree species, 18 forage species and 592 are medicinal plant species. In this budget year, we have conserved more than 50 accessions of 25 forest, forage and medicinal plant species in the field

gene banks. The major activities in field gene banks include management, characterization, preservation, taxonomic identification, and germination studies.

Table 1 Field gene banks, locations, size and number of conserved species

No	Name of Field Gene Bank	Geographic Location			Area (ha)	Number of species conserved
		Region	Zone	Woreda		
1	Addis Ababa	Addis Ababa	Addis Ababa	Yeka	0.8	35
2	Debre Tabor	Amhara	South Gonder	Farta	8.4	12
3	Zege	Amhara	Bahir Dar	Zege	1.3	87
4	Mandura	Benishangul-Gumuz	Metekel	Mandura	2.4	5
5	Assosa	Benishangul-Gumuz	Assosa	Assosa	17	12
6	Sherkole	Benishangul-Gumuz	Assosa	Sherkole	9	17
7	Bambasi	Benishangul-Gumuz	Assosa	Bambasi	8.2	45
8	Goba	Oromia	Bale	Goba	3.7	98
9	Adulala	Oromia	East Shewa	Liben	15	26
10	Lepis	Oromia	West Arsi	Arsi Negele	14.3	5
11	Gareno Gorota	Oromia	Bale	Goba	6.5	38
12	Dello Menna	Oromia	Bale	Delo Mena	1.9	23
13	Yabelo	Oromia	Borena	Yabelo	7.5	18
14	Wondo Genet	SNNP	Sidama	Wendo Genet	2.7	191
15	Kure	SNNP	South Omo	South Ari	0.5	125
16	Hawulti	Tigray	Mekele Special Zone	MekeleTown	28	25
17	Sawula	SNNP	Gamo Goffa	Demba Goffa	17.4	1
18	Melokoza	SNNP	Goffa	Melekoza	1	12
19	Dire Dawa	Dire Dawa	Dire Dawa	Kelad	10	Newly established
20	Negelle Arsi	Oromia	East Shewa	Negelle Arsii	24	Newly established
21	Gambella	Gambella	Agnewa	Gambella	135	
					Total	800



Figure 2. Wondo Genet medicinal plants (A) and Lephis field forest (B) gene banks,



Figure 3. Yabello Forage field gene bank

2.1.3 Botanical Gardens

Botanic garden is another *ex-situ* conservation approach where different collections of living plant species are grown/ conserved for the purposes of scientific research, conservation, display, and education. It is a garden with various plants of different species labelled with their scientific names. Botanic gardens are used to conserve those plants which are endangered/ threatened, provide information for research, education and serve as recreation site. Activities in botanic gardens include documentation of the plant species, monitoring, labeling and management of the plants.

The Forest and Range Land Plant Biodiversity Research Lead Executive has been maintaining forest, forage and medicinal plant species in botanic gardens. The Research Lead Executive has established three botanic gardens in Jima town, Shashemene, and recently at Shone town (Fig. 4). In these botanic gardens, the Research Lead Executive has grown and managed a total of 692 plant

species. In this year alone, more than 50 plant species are conserved within the established three botanical gardens.



Figure 4. Shashemene(Left), Jimma (middle) and Shone botanical gardens(Right)

2.1.4. Herbarium

Herbarium is a collection of preserved plant specimens used for scientific study, research, and education. Herbarium specimens are labeled with information like scientific name, local name, family of the specimen, date of collection, place of collection, and name of the collector. Herbarium is used as reference center for identification of plants by botanists doing research in taxonomy, ecology and agriculture. It keeps a permanent record of the distribution and abundance of plant species, which can be used to track environmental changes over time. The herbarium activities include collection of herbarium/plant specimen, pressing, drying, identification and preparation of label, mounting and labeling, and conservation/preservation.

The herbarium of Ethiopian Biodiversity Institute is established and managed by Forest and Range Land Research Lead Executive. To date, more than 7000 herbarium specimen collections are preserved/ conserved in EBI herbarium. Of these, more than 500 herbarium specimens have been collected, processed and added to the existed collections in this budget year. Out of the total herbarium collection 4000 samples were digitalized.



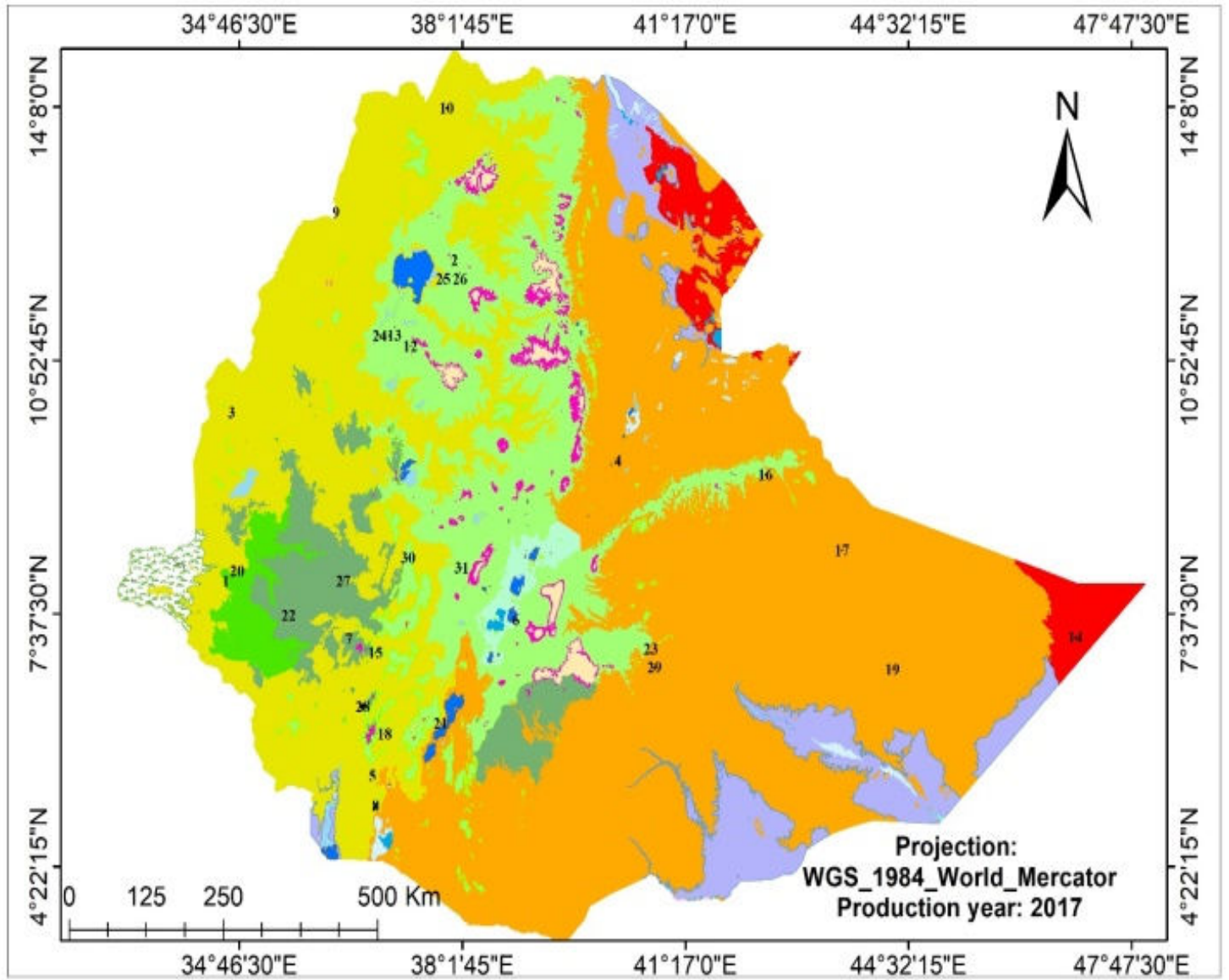
Figure 5. Herbarium specimen preparation/ conservation

3. In-Situ Conservation


3.1 In-situ Establishment and Management

The *in-situ* conservation is a preferable conservation strategy since the whole ecosystems are maintained through restoring and conserving of forest and range land genetic resources within their natural habitats. The forest and range land plant species that cannot be stored in cold gene banks are conserved employing this conservation approach. The additional advantage of *in-situ* conservation is that conservation of genetic resources under natural conditions allows species interactions with the prevailing environmental conditions including drought, storms, fluctuations of temperature, excessive rain, fire, pathogens etc. that makes the species to adapt to these ever-changing conditions. Moreover, *in-situ* conservation is cheaper when compared with the *ex-situ* conservation methods.

Establishment of *in-situ* conservation sites normally follows the result of forest inventory. So far a total of 32 *in-situ* conservation sites were established and under which over 1,593 species of forest, forage, and medicinal plants area under conservation.



Legend

 In situ Natural Forest Conservation Site in Ethiopia

Legend

-  Acacia tortilis wooded grassland and woodland
-  Acacia-Commiphora stunted bushland
-  Afroalpine vegetation
-  Afromontane moist transitional forest
-  Afromontane rain forest
-  Complex of Afromontane
-  Desert
-  Dry combretum wooded grassland
-  Edaphic wooded grassland
-  Freshwater swamp
-  Halophytic vegetation
-  Montane Ericaceous belt
-  Riverine wooded vegetation
-  Somalia-Masai Acacia-Commiphora deciduous bushland and thicket
-  Somalia-Masai semi-desert grassland and shrubland
-  Upland Acacia wooded grassland
-  Water bodies
-  lakes with Halophytic shoreline vegetation

ID	Name	Area_ha	R_Name	Z_Name	W_Name
1	Abobo	232.76	Gambella	Agnuwak	Abobo
2	Abogedam	193.08	Amhara	South Gondar	Libokenkem
3	Almetema	124.64	Benishangul Gumuz	Assosa	Homosha
4	Ambara	75.45	Afar	Zone 03	Ambara
5	Arego	534.74	SNNP	South Omo	Bena Tsamay
6	Behangari	259.52	Oromia	West Arsi	Arsi Negele
7	Bonga	141.51	SNNP	Kefa	Menjwo
8	Buska	3,515.97	SNNP	South Omo	Hamer
9	Das Gundo	62.58	Amhara	North Gondar	Matema
10	Dedebit	516.05	Tigray	North Western Tigray	Asegede Tsimbila
11	Endiras	72.47	Amhara	South Gondar	Fogera
12	Gechi	67.63	Amhara	West Gojjam	Sekela
13	Gelaw dios	145.47	Amhara	Aw i	Dengila
14	Gembereley	510.57	Somali	Dolo	Bookh
15	Genj Boka	95.2	SNNP	Konta	Konta Special
16	Hamedo	227.64	Oromia	East Hararge	Gursum
17	Hegleley	247.5	Somali	Jerer	Degahabur
18	Hoshelli Lomat	105.25	SNNP	Goffa	Uba Debera-Tsehay
19	Kabri Dhar	141.71	Somali	Korahi	Kabri dehar
20	Kermi	62.78	Gambella	Agnuwak	Gambela zurrya
21	Lambabara	234.01	South Ethiopia	Gamo	Marab Abaya
22	Masha	12.54	SNNP	Sheka	Masha
23	Oda Roba	42.06	Oromia	Bale	Giner
24	Quandisha	190.26	Amhara	Aw i	Dengila
25	Shelko Medhaniale	293.48	Amhara	South Gondar	Fogera
26	Shelo	80.17	Amhara	South Gondar	Farta
27	Sigmo Setema	105.8	Oromia	Jimma	Setema
28	Sirso	3,343.07	SNNP	Gamo Gofa	Melekoza
29	Sof Oumer	737.49	Oromia	Bale	Daw e Qaohen
30	Tiro Bother Becho	76.02	Oromia	Jimma	Chora Boter
31	Yeshibetiye Amba	100.9	SNNP	Gurage	Haw aryat
32	Zabezi	66.85	Amhara	West Gojjam	Meoha

Figure 6. Locations of *in-situ* conservation sites in Ethiopia and vegetation ecosystems.

3.2 Awareness Raising Activities

The Research Lead Executive has been carried out awareness-raising undertakings alongside with all forest inventory and *in-situ* site establishment efforts. These programs educated local communities on conservation practices, the purpose of *in-situ* sites, and methods for sustainably utilizing natural forests. Over the past years, awareness was given for over 600 individuals around established in-situ conservation sites. In this year, more than 120 individuals from two kebeles, as well as officials from 12 kebeles and the Woreda, participated in these awareness initiatives.



Figure 7. Awareness raising Activity

3.3 Native Tree seedlings Preparation and Restoration

Forest restoration involves rebuilding and maintaining forests to support and accelerate the recovery of degraded forest ecosystems. Ethiopia's forests are largely deteriorated and degraded. Restoring degraded land and protecting existing forests are central to Ethiopia's achieving the ambitious goals in its Climate Resilient Green Economy (CRGE) Strategy.

Ethiopia, cognizant of contributions of plant cover in terms of the varied ecosystem services, has been implementing a Green Legacy Initiative (GLI) and engaged in massive tree planting initiatives for meeting objectives like restoration and expansion of plantations for the last years, in line to halt the loss of biodiversity and ecosystem services there by developing a resilience to the impact of climate change.

On its part, the Ethiopian Biodiversity Institute (EBI) has played a significant role in supporting the GLI by Producing indigenous tree seedlings and distributing to the local communities, Municipalities, Regional Institutions, Schools and other organization (NGOs), providing seed for seedling production at different levels and awareness creation towards the use of indigenous tree species for plantation and restoration purpose, for the reasons that:

- These indigenous plant species satisfactorily play the role of restoring the already disrupted, degraded and lost habitats, ecosystems, other components of biodiversity and the associated services,
- They are more adaptive to the environment and hence their survival rate would be better,
- . They are less prone to pest attacks, diseases, windfall and their wood products are relatively strong and durable;
- Their ecological, cultural and socioeconomic multiple benefits (e.g. traditional medicinal use, agroforestry role and symbolic values) are more when compared to the exotic tree species

In connection with this, the Forest and Range Land Plant Biodiversity Research Lead Executive has produced about 16.3 million seedlings of native/indigenous forest trees/shrubs species over the last five years , including this budget year achievement (Figur 8). These seedlings were planted on degraded forest and watershed areas. .

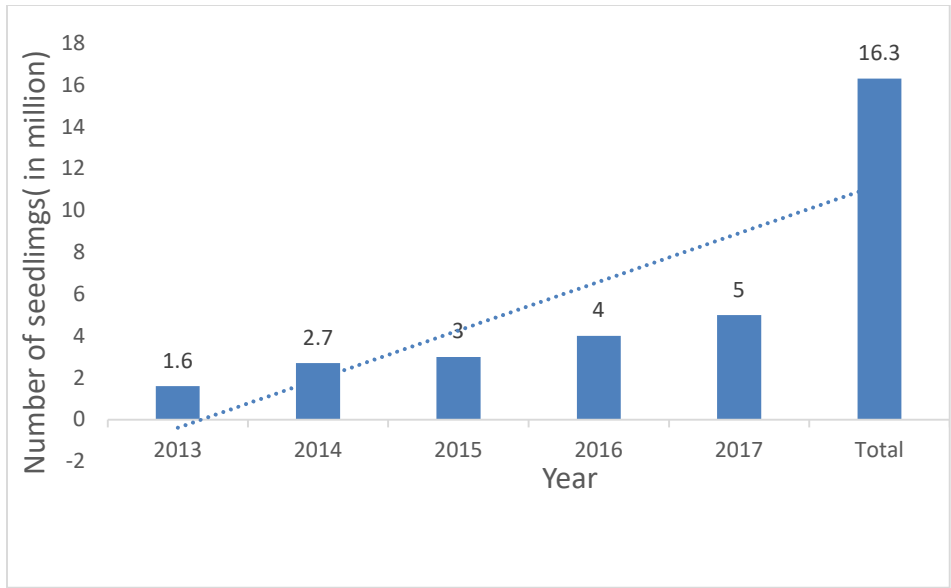


Figure 8. Number of Indigenous Tree Seedling produced



Figure 9. Seedling preparation in Biodiversity Centers

Some of the Restoration sites



Figure 10. Adulala Restoration site before (Left) After restoration (Right)

4. Biosphere Reserves

Biosphere Reserves (BRs) are areas of terrestrial and coastal/marine ecosystems or a combination thereof, which are recognized within the framework of UNESCO's program of Man and the Biosphere (MAB). It is area where conservation and sustainable development objectives are reconciled, and where environmental education and awareness raising, training, and research are contributing to the success of such an approach. It is where nature and humans co-exist in harmony.

Ecological conservation, sustainable development, and cultural heritage preservation are all integrated at the landscape scale by the biosphere reserve landscape approach. It leverages the zonation model (core, buffer and transition zones) to create a spatial framework for managing the interplay between humans and nature.

Understanding the importance of biosphere reserve approach of biodiversity conservation, Ethiopia has established six UNESCO designated Biosphere Reserves namely, Kefa Coffee Biosphere Reserve, Yaya Coffee Forest Biosphere Reserve, Sheka Forest Biosphere Reserve, Lake Tana Biosphere Reserve and Majang Forest Biosphere Reserve (Fig.11).

Five Biosphere Reserves in Ethiopia

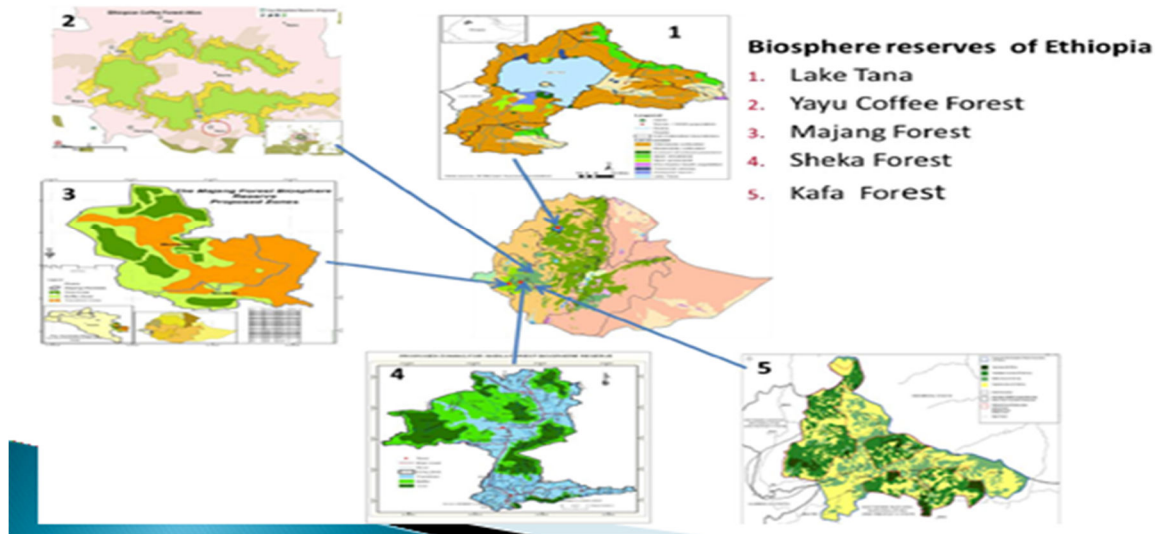


Figure 11. Ethiopian Biosphere Reserves

As one of the leading Institution responsible to coordinate the implementation of the UNESCO MAB of the Biosphere Reserves in Ethiopia, the Ethiopian Biodiversity Institute (EBI) in particular, the Forest and Rangeland Research Lead Executive has undertaken various activities. In this regards the EBI has played a leading role in achieving the following major achievement:

- It has organized various stakeholders' workshops to discuss on the status and management issues of biosphere reserves in Ethiopia
- A comprehensive biosphere Policy frame work has been drafted,
- A MAB committee working guideline was formulated and get approved by the MAB committee,
- Consecutive Biosphere Reserve Network annual meetings were held and discussed over issues pertain to the Challenges and opportunities related to Ethiopian biosphere reserves and experience were shared among BR managers
- The Periodic review of Yayu Forest Coffee Biosphere Reserve was evaluated, validated by the MAB committee and submitted to UNESCO
- Anyuwaa Forest and Natural Resource Nomination document was validated and get approved by the MAB committee and sent to UNESCO
- The Kundudo Ferla Horse Based Biosphere Reserve Preliminary survey was undertaken

This year, in collaboration with stakeholders in particular the South-west Ethiopia Peoples Regional Government Forest, Environment protection and Climate change Bureau, we have conducted Periodic review of Kafa Coffee Forest Biosphere Reserve and Sheka Forest Biosphere Reserve.



Figure 12. Field survey, community participation and Mini-Key stakeholder workshop on Kafa Coffee Biosphere Reserve periodic review

5. Research in the Lead Research Executive

Various researches have been conducted to provide timely and necessary information to support the conservation and sustainable utilization of forest, forage and medicinal plant species. The Lead Research Executive carried out a range of research and survey activities on priority research areas with the aim of bridging conservation and sustainable use gaps. Invaluable research has been conducted and the research findings have been published in proceedings, book chapter, and locally

and internationally indexed journals. Some of the publications are available on the <http://www.ebi.org.et>. Some of the Research and study undertakings are presented bellow.

5.1 Storage Behavior Study

Storage behavior of forest, medicinal and forage plants are undertaken in the gene bank. Currently, seed storage behavior studies are under way on three endemic wild species, namely *Acanthus sennii*, *Rhynchosia stipulosa* and *Pycnostachys abyssinica* (Fig. 13).

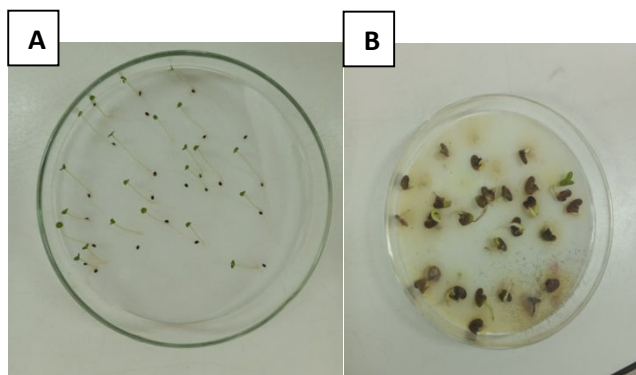


Figure13. Germinated seeds sawn to the study seed storage behavior of *Pycnostachys abyssinica* (A) and *Rhynchosia stipulosa* (B)

5.2 Characterization and Multiplication of Forage plant Species

In addition to conservation, forage plants species has been characterized for their traits. Nutritional and phenotypic characterization of forage species involves the systematic evaluation and analysis of both the nutritional content and physical and agronomic characteristics of various forage species. In this regard, a total of 320 accessions of 32 forage species were characterized for both nutritional and phenotypic traits. Among these, 200 accessions of 20 forage species were specifically evaluated for their nutritional values. Multiplication of forage species generally involves the processes aimed at increasing the quantity per sample to ensure sufficient amounts for conservation, distribution, and research purposes. So far 45 accessions of six forage species have been multiplied.



Figure 14. Forage morphological characterizations at Wondo genet field gene bank

5.3. Forest Inventory and Socio-economy Study

Before the establishment of forest in-situ conservation sites, it is essential to conduct forest inventory. The inventory and *in-situ* conservation activities include: forest inventory, assessing socio-economic survey, collection of herbarium specimens, identification of species, prioritization of species for conservation, awareness creation, demarcation, and mapping of *in-situ* conservation site, signing memorandum of understanding with relevant stakeholders, preparation and implementation of management plans. To this end, several inventories and socio-economic surveys have been conducted to establish forest *in-situ* conservation sites. This year alone, we have conducted five forest inventories in different natural forest ecosystem of the country. These were Lambabara Forest from Gamo Zone, Mirab Abaya woreda low land forest, Lala Natural Forest Dawero Zone, Halo-Bonja Natural Forest East Bale zone, Garamuleta Natural Forest East Harerege Zone, Jelo muktar natural Forest West Harerge zone. So far 73 forest inventories and socio-economic surveys have been undertaken across different natural forest ecosystems of the country.

6. Provision of services

6.1. Seed Distribution

Apart from conserving seeds of forest, forage and medicinal plant species, the gene bank supplies seeds of these genetic materials to various stakeholders for development and research purposes. This activity is in line with one of the objectives of the Convention on Biological Diversity (CBD), which demands ensuring sustainable use of the genetic resources. The ultimate users of the seeds broadly include universities, research institutions and development agencies.

In this year, we have provided 200 accessions of forest, forage and medicinal plants seeds to different institutions. In total, 5700 accessions of 275 species seeds distributed for research and development purposes.

6.2 Visiting and educational services

In addition to conservation, the forest gene bank provides services to visitors mainly from schools (KG, elementary, high schools) universities and research institutions). Accordingly, different stakeholders including universities, colleges, research institutions, and foreign nationals and individuals have been visited our forest seed conservation cold storage gene bank. In this year alone, we have provided visiting (and educational) services to more than 300 visitors coming from different high schools in Addis Ababa City Administration and higher learning. During the visits, awareness was given on practical aspects of seed collection, processing, handling and gene bank conservation. To date, over thousand customers visited our cold store gene bank and herbarium. Furthermore, the herbarium has facilitated taxonomic identification services to researchers from different institutions.

Additionally, a recreational and educational visit services have been provided to school and University students and to surrounding communities by Shashemene and Jima Botanical gardens.



Figure 15. Students from universities visiting herbarium

7. Conservation challenges

Despite efforts to conserve forest and range land plants, the challenges of effectively achieving the conservation goals/objectives are numerous and complex. The continually increasing rate of habitat loss is a consequence of human population growth and associated demands. Increasing demand for arable lands and over exploitation has been responsible for the progressive depletion of the forest and range land plant species. These are contributing to the increasing resource demand for conservation. The Ethiopian Biodiversity Institute (EBI) in general and the Forest and Range Land Lead Research Executive lack adequate financial and logistic resources for effective conservation actions. Lack of facilities and tools for molecular characterization of plant accessions and seed testing, as well as environmental and climatic change that impacts the survival and phenology of some targeted plant species, are major obstacles.

8. Future Plan

The Forest and Range Land Lead Research Executive has the drive to safeguard the forest and range plant resources focusing on the following points:

- With the full involvements of all stakeholders, assessing the status of forest & range land plants in all ecosystem and design appropriate conservation approaches

- Advance to molecular characterization
- Full inventory & management of Biosphere Reserves that aims at sustainable utilization and improving the livelihood of the communities.
- Update & digitalizing the forest gene bank & Herbarium,
- Strengthen & contribute to the Green Legacy Initiative