



THE GOVERNMENT OF THE FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA

The National Biodiversity Strategy and Action Plan

2025-2030



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MINISTRY OF AGRICULTURE



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ETHIOPIAN BIODIVERSITY INSTITUTE



Convention on
Biological Diversity

THE GOVERNMENT OF THE
FEDERAL DEMOCRATIC
REPUBLIC OF ETHIOPIA

The National Biodiversity Strategy and
Action Plan 2025-2030

Ethiopian Biodiversity Institute

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PREAMBLE

Ethiopia is endowed with enormous biological resources, which is vital to the overall national economy and cultural heritage, and has joined the Convention on Biological Diversity (CBD) by becoming the 54th signatory to the Convention. In a commitment to realize the Convention's objectives, Ethiopia undertook several activities such as preparing its National Biodiversity Strategy and Action Plans (Eth. NBSAP 2005-2010 and Eth. NBSAP 2015-2020), and developing its 2nd to 6th subsequent National Reports to the Convention.

Following termination of the second Eth. NBSAP 2015-2020, and based on the consequent Kunming-Montreal Global Biodiversity CoP 15/6 Decision: "Mechanisms for Planning, Monitoring, Reporting and Review"; Ethiopia has updated its third NBSAP (Eth. NBSAP 2025-2030) that contains 19 targets which are to be implemented by 17 national lead institutions. These targets contain 88 indicators and 124 actions, and the cost of their implementation that is estimated at 557,897,042 USD is computed on targets by targets and years by years basis. About 57% of the cost of implementation is expected to be covered by public fund while the gap is expected to be covered by funds which will be secured from other internal and external sources.

The updated Eth. NBSAP 2025-2030 assesses, *inter alia*, biodiversity resource base of the country, contribution of the resource to the national economy and livelihoods of the local communities, key drivers of the country's biodiversity loss, and institutional and legal frameworks associated with its implementation. The updating of the Eth. NBSAP 2025-2030 has been conducted carefully in a way that the Strategy and Action Plan outlined therein can greatly contribute to the achievement of the Green Legacy Initiative and its Vision of "Ensuring Ethiopia's prosperity through restoration of degraded landscapes, increasing forest cover, enhancing water resource availability, improving food and nutrition security." It is also planned to contribute for the grand Vision of the Agriculture and Rural Development Policy of Ethiopia where by 2038 agriculture will be transformed

and structural changes will be in place in rural areas in a way that they can significantly contribute to the country's prosperity aspirations. Similarly, its implementation arrangements are planned by taking into account an out-of-the-box approach whereby transformative change will be the guiding process of the entire endeavor where whole of the government and whole of the society are mobilized to fully and actively participate in the implementation of the Plan through combinations of unity, cooperation and collective actions by pursuing steadfastness, creativity and leapfrogging, as deemed necessary.

FOREWORD



Biodiversity is the indispensable foundation of our national economy, environment, and cultural heritage. It drives our economy through agricultural exports, sustains local livelihoods by providing food and feed, raw materials to industry and local construction, and medicine; among others, and supports essential ecological processes ranging from soil formation to pollination.

Ethiopia's unique geography and climatic diversity have fostered a spectacular array of ecosystems, making Ethiopia a globally recognized center of origin for critical crops like teff (*Eragrostis tef*), enset (*Ensete ventricosum*), and coffee (*Coffea arabica*). Ethiopia hosts two of the world's 36 biodiversity hotspots, and is a member of the Like-Minded Megadiverse Countries coalition.

For millennia, the natural abundance of Ethiopia's biodiversity resource base has been sustained by the rich knowledge of our diverse local communities. Yet, this vital resource is under unprecedented threat emanating from various anthropogenic and natural factors such as habitat conversion, unsustainable utilization, invasive species, pollution and climate change; leading to the eventual loss of the resource base. The loss of species and fragmentation of ecosystems poses a severe risk to food security, nutrition, and livelihoods; particularly for rural communities. It also critically undermines the resilience of our natural systems, directly challenging global collective vision of living in harmony with nature. Addressing these challenges requires a committed shift towards practices that enhance biodiversity while securing agricultural productivity and sustainable development.

In response, Ethiopia is deeply committed to a future of conservation and restoration. Through landmark national efforts like the Green Legacy Initiative and the new Agricultural and Rural Development Policy, Ethiopia is actively expanding forest cover, restoring degraded lands, and strengthening food security following green development path.

As a dedicated Party to the Convention on Biological Diversity (CBD), this updated National Biodiversity Strategy and Action Plan (Eth. NBSAP 2025-2030) embodies our pledge to fulfill both national aspirations and global commitments. It provides a strategic framework to guide our actions in conservation, sustainable use, and equitable sharing of benefits accrued from the use of our genetic resources. Launched at a pivotal moment, this Strategy will be instrumental in scaling up our successful landscape restoration efforts and building a resilient and prosperous Ethiopia for generations to come.

I, therefore, call upon all federal and regional institutions, development partners, and other stakeholders to unite for the effective and successful implementation of the Eth. 2025-2030 NBSAP.



H.E. Eyasu Elias (PhD, Prof.)

State Minister, Ministry of Agriculture

PREFACE



As Ethiopia's rich tapestry of life, its biodiversity is the very foundation of our nation's prosperity and cultural heritage. As an agrarian society with a significant rural population, our well-being is inextricably linked to the vital ecosystem services of provisioning, regulating, supporting, and cultural services that nature provides. Yet, this precious resource faces unprecedented degradation, accelerated by combinations of complex natural and anthropogenic drivers.

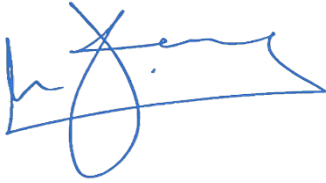
In response to these pressing challenges, and in fulfillment of our commitment as a Party to the Convention on Biological Diversity (CBD), Ethiopia has undertaken a comprehensive and collaborative revision of its National Biodiversity Strategy and Action Plan (NBSAP). It builds upon a critical analysis of past efforts, incorporating lessons learned to chart a more effective and resilient path forward. This Strategy and Action Plan, the Eth. NBSAP 2025-2030, is the product of an inclusive, "whole-of-government, whole-of-society" approach.

The Eth. NBSAP 2025-2030 aligns with the global Kunming-Montreal Global Biodiversity Framework (GBF) while meticulously tailored to Ethiopia's unique realities, namely: challenges our biodiversity resource base is facing, and national priorities and existing capacities. It presents a robust framework of 19 targets, which contain 88 indicators and 124 concrete actions, each with designated lead and collaborating institutions, a detailed timeline, and estimated cost of implementation. The Eth. NBSAP 2025-2030 serves as our national roadmap, guiding policy decisions and mobilizing action to secure Ethiopia's natural capital for current and future generations.

I extend my profound gratitude to the former Ethiopian Biodiversity Institute (EBI) leaders who started the updating process, the whole EBI staff for their indispensable contributions, National Steering Committee, National Biodiversity Platform, all federal and regional stakeholders, technical experts, reviewers, partners and the Project Coordinator whose

dedication made this strategy possible. Special acknowledgment is due to the GEF and UNEP for their invaluable financial and technical support, and to the CBD Secretariat for its steadfast guidance. The successful implementation of this NBSAP demands our collective resolve.

Therefore, I call upon every stakeholder from government agencies, the private sector, academic and research institutions, local communities, development partners and NGOs to act together for the effective implementation of the Strategy and achieve our shared vision of a sustainable and biodiverse Ethiopia.



H.E. Karta Kaske (PhD)

Director General, Ethiopian Biodiversity Institute

Primary National Focal Point, Convention on Biological Diversity

ACRONYMS

ABS	Access and Benefit Sharing
AEWA	African-Eurasian Migratory Waterbird Agreement
AI	Artificial Intelligence
AnGR	Animal Genetic Resources
BMNP	Bale Mountains National Park
CBD	Convention on Biological Diversity
CHM	Clearing House Mechanism
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CMS	Convention on the Conservation of Migratory Species of Wild Animals
CoP	Conference of the Parties
CR	Critically Endangered
CSA	Central Statistics Agency (Now, ESS)
CTA	Coffee and Tea Authority
EBI	Ethiopian Biodiversity Institute
EFD	Ethiopian Forest Development
EIAR	Ethiopian Institute of Agricultural Research
EIAs	Environmental Impact Assessments
EN	Endangered
EOSA	Ethio-organic Seed Action
ESS	Ethiopian Statistical Service

EWCA	Ethiopian Wildlife Conservation Authority
EWNHS	Ethiopian Wildlife and Natural History Society
EWPs	Edible Wild Plants
FAO	Food and Agriculture Organization of the United Nations
FDI	Foreign Direct Investment
FDRE	Federal Democratic Republic of Ethiopia
FTCs	Farmer Training Centers
GBF	Global Environmental Facility
GBF-EAS	Global Biodiversity Framework-Early Action Support
GBN	Global Business Network
GDP	Gross Domestic Product
GERD	Great Ethiopian Renaissance Dam
GIS	Geographic Information System
GMOs	Genetically Modified Organisms
HoPRs	House of People's Representatives
IAS	Invasive Alien Species
ITA	International Trade Administration
IBC	Institute of Biodiversity Conservation (now, EBI)
IPBES	Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services
IUCN	International Union for Conservation of Nature
K-M GBF	Kunming-Montreal Global Biodiversity Framework
LMMC	Like-Minded Mega Diverse Countries
MoA	Ministry of Agriculture

MoF	Ministry of Finance
MoFED	Ministry of Finance and Economic Development (now, MoF)
NBE	National Bank of Ethiopia
NBP	National Biodiversity Platform
NBSAP	National Biodiversity Strategy and Action Plan
NBSAP-TC	NBSAP Technical Committee
NGOs	Non-governmental Organizations
NSC	National Steering Committee
NTFPs	Non-timber Forest Products
PES	Payment for Ecosystem Services
PFM	Participatory Forest Management
SCBD	Secretariat of the CBD
SMNP	Semien Mountains National Park
TT	Technical Team
UNCTAD	United Nations Conference on Trade and Development
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
USAID	United States Agency for International Development
USDA	U.S. Department of Agriculture
VU	Vulnerable
WDPA	The World Database on Protected Areas

EXECUTIVE SUMMARY

Ethiopia is endowed with diverse geographic features and climatic variability. The wide range of altitude covering from 126m below sea level to 4620m above sea level is the major driver of diversity in physio-geographic features that comprise high and rugged mountains, flat-topped plateaus, deep gorges, incised river valleys, lakes and rolling plains. This made the country to be ecologically diverse with chains of highlands, midlands and lowlands. Ethiopia is endowed with various ecosystems that are classified into five broad categories, namely: Mountain, Forest and Woodland, Aquatic and Wetland, Rangeland, and Agro-ecosystems that are inhabited by diverse plant, animal and microbial genetic resources, including the endemic elements; making the country among the global biodiversity hotspots. Apart from ecological and environmental factors driving the diversity, socio-ecological systems have also contributed to the rich biological resources, because Ethiopia is a country of various ethnic groups associated with diverse languages, cultures, and community knowledge.

Ethiopia is recognized as one of the Vavilovian centers of origin and/or diversity for certain crop genetic resources. It is also a member of the Like-Minded Mega Diverse Countries (LMMC), and hosts two of the 36 Global Biodiversity Hotspots. Ethiopia has diverse plant genetic resources of wild and cultivated origin distributed across a wide range of environments with the higher plants estimated at over 6000 species 10% of which are endemic to the country. Diverse wild plant species exist in Ethiopia distributed across natural and semi-natural habitats mainly hosted by forests. They include plants of both economic and cultural importance such as medicinal plants, forage and wild edible plants. Diverse field and horticultural crops are cultivated in the country, but their status is decreasing over time attributed to different factors such as replacement of farmers' varieties, diseases and pests, deforestation, agricultural expansion, overharvesting, overgrazing, frequent drought, invasive species, habitat conversion, unreliable rainfall, and market related socioeconomic factors.

Around 100 indigenous farm animal breeds and species are reported to exist in Ethiopia with cattle, chicken, sheep and goats leading in the number of breeds. Moreover, other domestic farm animals such as various breeds of horses, donkeys and mules exist in the country. There are also exotic breeds of some livestock categories introduced to Ethiopia that gradually crossed with indigenous breeds for the purpose of improving egg, milk and meat production. There are 3,230 wild mammal species in Ethiopia of which 55 species are endemic. Similarly, there are 926 bird species of which 24 are endemic. Furthermore, 4,693 species of arthropods with 823 endemic species; 81 amphibian species, including 30 endemics and 242 reptile species with 19 endemic species are registered to occur in Ethiopia. Nevertheless, 88 species of wild animals are threatened at different threat levels of the IUCN category. Besides, wildlife habitats such as aquatic and wetlands are subjected to various levels of threats ranging from habitat degradation, overharvesting, unsustainable water use, siltation, mining, wetland drainage for alternative land uses to pollution. Diverse microbial genetic resources exist in the country although few data exist on their exploration, collection, characterization and conservation, owing to the limited capacity in the sector. Despite the limited efforts, the Ethiopian Biodiversity Institute has identified and conserved 1,350 species of bacteria, fungi and microalgae in its gene bank. Similar to their exploration, collection and conservation, limited data exist on the extent of threats to the country's microbial genetic resources except the generally held consensus that factors that impact ecosystems, and plant and animal diversity are also believed to affect microbial genetic resources.

Given that Ethiopia is home to over 80 ethnic groups with distinct languages and dialects, the culture is diverse, which is closely linked to a wide range of community knowledge, practices and innovations associated with the conservation and sustainable use of the country's biodiversity. The diverse farming and pastoralist communities have maintained various crop, livestock, and associated biodiversity resources through their community knowledge and traditional practices over using plants and animal resources in their daily lives. Nevertheless, community knowledge associated with biodiversity is declining due,

mainly, to reliance on modern healthcare, loss of native plant and animal species and weak integration of community knowledge and practices into modern scientific practices.

Biodiversity and ecosystems proved mankind with diverse ecosystem services that are categorized into provisioning (food, fresh water, fuel wood, fiber, bio-chemicals, and genetic resources), supporting (soil formation, nutrient cycling and primary production), regulating (regulation of climate, disease, water, and purification and pollination), and cultural services (spiritual, religious, recreation, eco-tourism, esthetic, inspirational, educational, and cultural heritage services). Despite that data on the monetary values of these biodiversity and ecosystem services are scanty in Ethiopia; there are crude and proxy indications of ecosystem services from various elements of biodiversity. Agriculture contributes around 40% to GDP and accounts for 80% of exports. Export earnings and GDP contributions from coffee, pulses, oil crops, fruits, spices, chat, cereal crops, live animal and their products are major contributions from cultivated crops and farm animals. Similarly, forest resources contribute significantly to the country's economic, ecological, and social well-being with nearly 12.86% contribution to the GDP. Although not quantified in monetary values, cultural diversity and associated indigenous knowledge also play invaluable roles in a variety of fields such as agriculture, health care services, weather or climate services and natural resource conservation. However, biodiversity and ecosystem services in Ethiopia are under pressure from direct and indirect drivers. Habitat loss, overexploitation, invasive alien species and woody encroachers, climate change, replacement of farmers' varieties and breeds, and pollution are the direct drivers of biodiversity loss. Indirect drivers that trigger biodiversity loss through their effects on direct drivers include demographic pressure, poverty, low level of awareness and lack of coordination among stakeholders.

In response to these threats and challenges and cognizant of the values of biodiversity, the Ethiopian government has made tremendous efforts to reverse the situation and promote biodiversity conservation, sustainable use and accesses to genetic resources and equitable sharing of benefits accrued from their use. Along with this, the country has ratified

international and regional treaties such as CBD, ITPGRFA, CITES, CMS, World Heritage and AEWA, including acceding to the Nagoya protocol. As part of the global and national efforts to achieve the CBD objectives, Ethiopia has prepared and successfully implemented the first and second NBSAPs followed by the preparation of the present 2025-2030 NBSAP. A wide range of relevant stakeholders participated in the updating of the Strategy and the Action Plan under the lead coordination of Ethiopian Biodiversity Institute. The process involved establishment of multi-stakeholder technical and steering committee at various levels, inception workshop, drafting national targets, a series of consultative meetings of the National Biodiversity Platform at different milestones of the updating process, including a final validation and launching workshops.

The updated Ethiopian National Biodiversity Strategy and the Action Plan (Eth. NBSAP 2025-2030) consists of eight chapters. **Chapter One** gives description of physiographic and climatic features, administrative arrangements, demography and economic development as well as the overview on biodiversity of the country. **Chapter Two** describes the biodiversity resource base, within the ecosystems; consisting of plant, animal and microbial diversity and associated cultural diversity along with their status and trends. **Chapter Three** presents values of biodiversity and ecosystem services with a special focus on values of agro-biodiversity including coffee, and values of forest and wildlife resources. It further describes the direct and indirect values of protected areas and other natural resources. **Chapter Four** outlines the direct and indirect drivers threatening biodiversity leading to local extinction of species in Ethiopia. **Chapter Five** describes biodiversity governance and institutions such as policies, strategies, proclamations and regulations. These strategic and legal instruments include both existing and emerging legal frameworks. **Chapter Six** gives a detailed account of lessons drawn from implementation of the previous NBSAPs and the processes involved in revising the current one. **Chapter Seven** provides the globally shared vision, mission, goals, guiding principles and targets. The targets that have been aligned with the Kunming-Montreal Global Biodiversity Targets and Goals are further described using technical rationale, implementation strategy and milestones. **Chapter Eight** presents implementation arrangements outlining the overall

coordination mechanisms with a leading role of the Ethiopian Biodiversity Institute in establishing of the NBSAP-Technical Committee and running of the National Biodiversity Platform (NBP) that are drawn from various government and non-governmental organizations. It also describes mechanisms of resource mobilization, data sharing (CHM), monitoring and evaluation, and reporting during implementation of the Strategy.

The vision of the Kunming-Montreal Global Biodiversity Framework is a world of living in harmony with nature where “by 2050, biodiversity is valued, conserved, restored and wisely used, maintaining ecosystem services, sustaining a healthy planet and delivering benefits essential for all people.” The mission of the Framework for the period up to 2030 is to take urgent action to halt and reverse biodiversity loss to put nature on a path to recovery for the benefit of people and planet by conserving and sustainably using biodiversity and ensuring the fair and equitable sharing of benefits from the use of genetic resources, while providing the necessary means of implementation, and the Kunming-Montreal Global Biodiversity Framework has the following four Goals.

- Goal A: Substantially increase the area of natural ecosystems by maintaining, enhancing, or restoring the integrity, connectivity, and resilience of all ecosystems. Reduce by tenfold the extinction rate and risk of all species, and increase the abundance of native wild species. Maintain the genetic diversity of wild and domesticated species and safeguard their adaptive potential
- Goal B: Ensure nature’s contributions to people are valued, maintained, and enhanced, with those contributions currently in decline being restored
- Goal C: Share the monetary and non-monetary benefits of the utilization of GR, DSI on genetic resources, and TK associated with Indigenous people and local communities. Ensure TK knowledge is appropriately protected.
- Goal D: Ensure all parties (specifically developing countries) have adequate means to implement the GBF. This includes financial resources, capacity building, technical and scientific cooperation, and access to technology.

Under the above shared four global Goals, Ethiopia has developed the following 19 National targets.

Eth - Target 1: By 2030, areas of high biodiversity importance are spatially planned, and effectively managed and increased from the existing 30% to 80%, addressing land-use changes in full participation of stakeholders.

Eth - Target 2: By 2030, forest coverage is increased from 23.6% to 30%, area of degraded wetland decreased by 20% from the existing 27,142.5km² and degraded terrestrial land decreased by 20% from the existing 85,243km², extent of conversion of grazing land decreased from 43.7% to 30% through fostering ecosystem-based management approach, there by at least 30% of the degraded land is restored.

Eth - Target 3: By 2030, ecologically representative protected areas including biosphere reserves and inland waters are increased from 12 to 30%, while the existing 0.08% ecosystem and species based in-situ sites are doubled through enhancing their ecological connectivity and effective management by actively engaging local communities.

Eth - Target 4: By 2030, *in situ* conservation of agrobiodiversity is increased from 178 to 205 sites for conservation of crop varieties and animal breeds on farm, and management standards of the existing are improved.

Eth - Target 5: By 2030, *ex-situ* conservation; emphasizing endemic, endangered, economically and ecologically important species of crop varieties of 92,258 accessions, 3,644 accessions of forest species, 120,000 strains of animal breeds and 1,350 microbial species/strains are increased by 10%, 25%, 50%, and 10%, respectively; and standards of the existing *ex situ* conservation are improved.

Eth - Target 6: By 2030, proportion of areas invaded by invasive alien species are reduced by 50% from the existing 3,949,314ha through eradicating the existing invasions and preventing their introduction and expansion.

Eth - Target 7: By 2030, pollution of major ecosystems is reduced by at least 10% from the existing 10 million tones by application of innovative measures, with emphasis on municipal and industrial sources.

- Eth - Target 8: By 2030, land-based mitigation and adaptation measures contribute to the reduction of at least 152.75 MtCO₂e from the BAU scenario of 346 MtCO₂e, and inter-sectoral coordination towards biodiversity mainstreaming in the climate actions is increased.
- Eth - Target 9: By 2030, unsustainable utilization of wild genetic resources is reduced ensuring that all uses, including harvesting and trading activities are implemented sustainably, safely and legally.
- Eth - Target 10: By 2030, biodiversity issues are integrated into agricultural systems through application of biodiversity friendly practices and use of improved decision support processes in agricultural production systems, where at least 25% of agricultural land is put under agro-ecological practices.
- Eth - Target 11: By 2030, 75 urban centers put 30% their land under spatially planned green areas through biodiversity inclusive urban planning.
- Eth - Target 12: By 2030, access to genetic resources for research and development of 294,616 crop and horticulture accessions, 5700 forest and rangeland plants accessions, 9,000 straws of semen of domestic animals, 620 accessions of microbial species/strains and 1500 access permits are increased by 32%, 18%, 67%, 17% and 55%, respectively and value addition and market linkage are carried-out for at least 18 biological commodities.
- Eth - Target 13: By 2028, biodiversity and ecosystem services related laws, in including those associated with incentives are studied, reviewed and integrated into the national and local development policies, strategies and plans.
- Eth - Target 14: By 2030, a system of regulation and guideline are formulated, integrated to tax and business laws and enforced to implement biodiversity compliance to offset negative impacts of business activities on biodiversity.
- Eth - Target 15: By 2028, biodiversity priorities and concerns are integrated into biosafety regulatory framework and capacity to regulate transaction of GMOs is enhanced.
- Eth - Target 16: By 2030, capacity to implement biodiversity conservation, sustainable

utilization and access and benefit sharing are improved by strengthening information technology, gene banks and laboratory infrastructures through technology transfer, and scientific and technical cooperation; including through South-South and North-South cooperation.

Eth - Target 17: By 2030, data, information and comprehensive knowledge and innovations related to biodiversity values, ecosystem functioning, status and trends are generated, and the consequences of biodiversity loss are determined, reviewed, compiled and made accessible to decision makers, practitioners and the public, and are applied in biodiversity related planning and decision-making processes.

Eth - Target 18: By 2030, gender equality and a gender-responsive approach for biodiversity actions is ensured through awareness, participation, and social inclusion of disability, youth, and children, and other vulnerable groups, and the actions that the stakeholders can take to conserve and use biodiversity sustainably is improved.

Eth - Target 19: By 2029, mobilization of financial resources from domestic sources required for effective implementation of the strategy by mandated sectoral institutions is increased at least by 57% and strategy is devised to secure additional fund from other internal and external sources.

CONTENTS

PREAMBLE..... *i*

FOREWORD..... *iii*

ACRONYMS..... *vii*

EXECUTIVE SUMMARY..... *x*

LIST of TABLES..... *xxi*

LIST of FIGURES..... *xxi*

CHAPTER ONE..... **1**

1. INTRODUCTION..... **1**

 1.1. Physio-geographic and Climatic Features..... 1

 1.2. Administrative Regions and Population..... 3

 1.3. Economy..... 4

 1.4. Biodiversity 5

CHAPTER TWO..... **6**

2. BIODIVERSITY RESOURCE BASE..... **6**

 2.1. Ecosystem Diversity 6

 2.1.1. Mountain Ecosystem..... 8

 2.1.2. Forest and Woodland Ecosystem 12

 2.1.3. Rangeland Ecosystem 21

 2.1.4. Aquatic and Wetland Ecosystem..... 24

 2.1.5. Agroecosystem..... 28

 2.2. Plant Genetic Resources 30

 2.2.1. Crop genetic resources and their wild relatives..... 31

 2.2.2. Wild plant genetic resources 36

 2.3. Animal Genetic Resources 41

 2.3.1. Farm animal genetic resources 41

 2.3.2. Wild and aquatic animal genetic resources 44

 2.5. Cultural Diversity 54

CHAPTER THREE..... **56**

3. VALUES OF BIODIVERSITY AND ECOSYSTEM SERVICES..... **56**

 3.1. Values of Agricultural Diversity 56

 3.1.1. Crop genetic resources 56

 3.1.2. Farm animal genetic resources 59

3.2. Forest and its Ecosystem Services.....	61
3.3. Wildlife and Ecosystem Services in Protected Areas.....	62
3.4. Microbial Genetic Resources	63
3.5. Values of Cultural Diversity/Indigenous Knowledge	65
CHAPTER FOUR	66
4. CAUSES AND CONSEQUENCES OF BIODIVERSITY LOSS	66
4.1. Direct Causes and Consequences	66
4.1.1. Habitat conversion	66
4.1.2. Unsustainable utilization.....	68
4.1.3. Invasive alien species.....	69
4.1.4. Climate change.....	71
4.1.5. Replacement of farmers' varieties and breeds.....	72
4.1.6. Pollution	73
4.2. Indirect Causes	75
4.2.1. Demographic change.....	75
4.2.2. Poverty	75
4.2.3. Low level of awareness and lack of coordination	76
4.2.4. Policies and institutions.....	76
CHAPTER FIVE.....	77
5. BIODIVERSITY GOVERNANCE AND INSTITUTIONAL ARRANGEMENTS.....	77
5.1. Institutional Frameworks.....	77
5.2. Policy and Legal Frameworks	78
5.2.1. Government policy frameworks.....	79
5.2.2. Legislative frameworks.....	87
CHAPTER SIX.....	92
6. LESSONS FROM THE PREVIOUS NBSAPS IMPLEMENTATION AND REVISION..	92
6.1. Lessons Learned from Previous NBSAPs.....	92
6.2. The Process of Revising the NBSAP	93
CHAPTER SEVEN	96
7. NATIONAL BIODIVERSITY STRATEGY	96
7.1. Vision	96
7.2. Mission	96

7.3. Goals.....	96
7.4. Principles	97
7.5. National Biodiversity Targets.....	97
CHAPTER EIGHT	153
8. IMPLEMENTATION ARRANGEMENTS.....	153
8.1. Coordination.....	153
8.2. Resource Mobilization.....	155
8.3. Plans for Clearing House Mechanism	155
8.4. Monitoring and Evaluation.....	155
8.5. Reporting.....	156
REFERENCES	157
ANNEXES	175

LIST of TABLES

Table 1: The alignment of previous ecosystems and the newly clustered five ecosystems 8

Table 2: Ethiopian protected areas by category and management authorities..... 50

Table 3: Summary of achievements in biodiversity conservation and sustainable use 55

Table 4: Summary of the status of degradation, pollution and IAS distribution 55

Table 5: Export performance of crop genetic resources (million USD)..... 57

Table 6: Ethiopian coffee export and revenue (2021- 2025)..... 58

Table 7: Export performance of farm animal genetic resources (millions USD)..... 60

Table 8: Contribution of major non-timber forest products to the National income..... 61

Table 9: Ecosystem services value coefficients (US\$ ha-1 Yr-1) for forest 63

Table 10: IAS and their distribution in different regions 70

Table 11: Goals, targets, actions, implementing agencies and period of implementation **Error!**
Bookmark not defined.

Table 12: Relationships between Ethiopia's National Biodiversity Targets and the GBF..... 150

LIST of FIGURES

Figure 1: Administrative setup of the Ethiopia (Sources: SSGI, 2025) 3

Figure 2: Ethiopian Agricultural Land (Source: SSGI, 2022)..... 19

Figure 3: Livestock grazing on regenerated communal pasture during Meskel festival (photo credit: Dikire) 24

Figure 4: Lake Chelekleka time series map (Source: SSGI, 2025) 27

Figure 5: Lake Adele time series map (Source: SSGI, 2025)..... 27

Figure 6: Lake Haromaya time series map (Source: SSGI, 2025) 28

Figure 7: Forest land cover map of Ethiopia (Source: SSGI and EFD, 2022) 37

Figure 8: The change in composition of chicken breeds in Ethiopia (2014-2021)..... 43

Figure 9: Important Bird Areas of Ethiopia (Birdlife International, 2001) 46

Figure 10: Distribution of the Ethiopian wetlands (Source: GSSI, 2022c) 47

Figure 11: Protected Areas of Ethiopia (EWCA et al., 2025) 51

Figure 12: Land use land cover map of Ethiopia (Source: SSGI, 2022) 67

CHAPTER ONE

1. INTRODUCTION

1.1. Physio-geographic and Climatic Features

Ethiopia is situated within the Horn of Africa, sharing borders with Eritrea to the north, Djibouti and Somalia to the east, Kenya to the south, and Sudan and South Sudan to the west. It extends from 3° to 15°N latitude and 33° to 48°E longitude, it covers a total land area of 1,127,127 square kilometers (Ethiopian Mapping Agency, 2021). Its geographic location, combined with a highly diverse topography and climate, contribute to Ethiopia's designation as a global biodiversity hotspot. This environmental complexity, shaped by ongoing geological and climatic processes, supports an extraordinary variety of plant, animal, and microbial species, highlighting the country's ecological significance on a global scale.

Ethiopia's landscape is characterized by exceptional physiographic diversity, shaped by millions of years of tectonic rifting, volcanism, uplift and erosion. This complex geological evolution has produced dramatic elevation contrasts from the Danakil Depression at 126 meters below sea level to Mount Ras Dashen, the country's highest peak at 4,620 meters above sea level, comprising a rugged terrain that includes highland plateaus, steep mountains, deep river gorges, and rolling plains. A defining feature of this terrain is the Ethiopian Rift Valley, a major segment of the East African Rift System, which runs from northeast to southwest and divides the Northwestern and Southeastern Highlands (Chorowicz, 2005; Ayele *et al.*, 2007; Gani *et al.*, 2007).

Encircling the central highlands are vast lowland regions, semi-arid to arid areas that extend toward the eastern, southern, and western borders. These zones serve as transitional belts linking the elevated core of the country to the surrounding landscapes and neighboring countries (Hurni, 1998).

Ethiopia's elevation gradient contributes to the formation of numerous isolated ecological niches and microclimatic zones over short distances. This vertical stratification is a key factor in the country's exceptional biological richness and high levels of endemism. Prominent landforms such as the Simien and Bale Mountains, the dissecting Rift Valley, and the surrounding lowlands constitute distinct biogeographic regions. The Rift Valley itself serves as a significant ecological and genetic barrier, fostering divergence among species and enabling the evolution of unique flora and fauna on either side (Friis *et al.*, 2010).

Ethiopia's climate exhibits marked spatial and temporal variability, shaped predominantly by its diverse topography, wide altitudinal range, and the seasonal movement of the Inter-Tropical Convergence Zone (Conway, 2000). The country experiences a bimodal rainfall regime: the main rainy season, *Kiremt* (June to September), delivers the majority of precipitation across the highlands and western regions, while the shorter *Belg* season (February to April) brings more localized and less intense rainfall (Viste *et al.*, 2013).

Annual rainfall distribution varies significantly from under 500 mm in arid lowland zones such as the Danakil and Ogaden, to over 2,800 mm in the humid southwestern highlands, home to dense Afromontane and cloud forests (Hurni, 1998; World Bank Climate Knowledge Portal, 2025). This variability supports a wide range of ecosystems, from xeric shrublands to lush montane habitats.

Ethiopia's temperature patterns are highly variable, largely shaped by elevation, with highland areas above 2,500 meters experiencing mean annual temperatures below 15°C, dropping under 10°C at the highest elevations while lowland regions below 1,500 meters often exceed 25°C, and some arid zones surpassing 30°C (Conway, 2000). Diurnal temperature variation is notably sharp in elevated areas. This diversity, driven by the interplay of latitude, elevation, and seasonal atmospheric circulation, creates a patchwork of microclimates that support a wide range of ecological systems and underpin Ethiopia's remarkable environmental and biological richness.

1.2. Administrative Regions and Population

Ethiopia's administrative structure has evolved and now comprises twelve regional states (Figure 1) and two city administrations (FDRE Constitution, Proclamation No. 1237/2021). Ethiopia is one of Africa's most linguistically rich nations (Eberhard *et al.*, 2024). Amharic has been the official working language of the Federal Government, while four additional languages -Afaan Oromo, Somali, Tigrinya, and Afar - have been officially recognized recently and adopted by the Federal Government as working languages of Ethiopia (Getachew, 2020). English is widely utilized as the primary medium of instruction in higher education and research institutions.

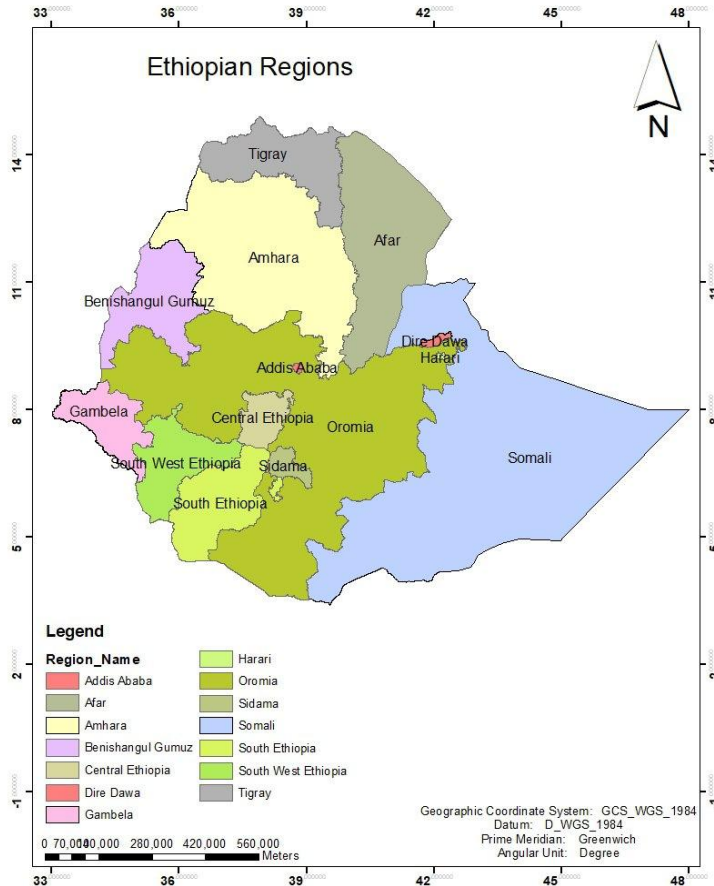


Figure 1: Administrative setup of the Ethiopia (Sources: SSGI, 2025)

Ethiopia's population has grown significantly and is currently estimated at over 111.7 million, making the country the second most populous nation in Africa after Nigeria, of which 83.8 and 27.9 million are living in rural and urban settings, respectively. The country's annual population growth rate is projected at around 2.6% and the population is estimated to reach 122.3 million by 2030, of which 89.4 and 32.9 (26.9%) million will live in rural and urban settings, respectively (ESS, 2025).

1.3. Economy

The Ethiopian economy continues to grow steadily, driven by a structural shift from agriculture toward services and industry. The growth of real GDP for the year 2023/24 is registered at 8.1%, and it is expected to reach 8.4% in the fiscal year 2024/25. The Ethiopian economy has registered higher growth, which is double the SSA average, despite external and domestic challenges. This growth is driven equally by services, agriculture, and industry from the supply side and by personal spending & investment from the demand side. The agriculture sector accounts for roughly 31.8% of GDP, while industry and services represent about 29.1% and 40.2%, respectively (NBE, 2024). The Ministry of Finance highlights improved fiscal discipline via public investment and a tighter budget deficit underpinned by disciplined execution and fiscal consolidation efforts (MoF, 2024).

Inflation, once above 30%, after the adoption of a market-determined exchange rate in July 2024 has started to fall and has now been contained between 13 and 14% through prudent monetary policy and tighter fiscal policy measures (NBE, 2024). Export of goods and services exceeds USD 10 billion, the majority of the export earning is received from key agricultural products and mineral commodities; and according to NBE report foreign reserve is improving and showed a fourth-fold jump (NBE, 2025). This strong performance of export earnings was largely driven by a substantial rise in both the value and volume of gold and coffee exports. Meanwhile, the per capita GDP and FDI continue to show improvement, reflecting the ongoing efforts to stabilize the country's macroeconomic imbalances by improving business environments to attract foreign investments. Following the implementation of market determined exchange rate policy which is the objective of

Home-Grown Economic Reform 2.0; there are a lot of improvements in the Ethiopian economic outlooks.

Looking ahead, Ethiopia prioritizes in advancing its digital economy, renewable energy, and agribusiness aligned with national industrial policy aiming at achieving the ambitious goal of becoming lower-middle-income status. Structural challenges persist, particularly weak export performance, logistics, low foreign reserve, and productivity gaps. In order to solve such distortions, the government is implementing the Home-Grown Economic Reform 2.0 by sustained macroeconomic management, fiscal prudence, and reforms (MoF, 2024; NBE, 2024).

1.4. Biodiversity

Ethiopia's bountiful biodiversity and diverse and unique ecosystems are critical to its development. These are its key resources that underpin the country's economic, environmental, and human well-being by providing essential goods and services. Biodiversity has a major share in the country's overall economic, social and cultural success. Living in harmony with nature is Ethiopia's singular path to a prosperous future.

CHAPTER TWO

2. BIODIVERSITY RESOURCE BASE

Ethiopia is endowed with diverse ecosystems; due to its unique geological history, altitude, climatic and soil conditions that support unique and diverse biological resources. These ecosystems comprise two of the 36 Global Biodiversity Hotspots (the Eastern Afromontane and the Horn of Africa), supporting a large number of endemic animal and plant species along with their threatened habitats. The ecosystems are home to diverse plant species, including endemic elements. The higher plants include domesticated and their wild relatives. Ethiopia is also among the Vavilovian centers of origin and/or diversity for certain crop genetic resources. It also harbors diverse wild and domestic animal species, breeds, microbial biodiversity, and associated community knowledge. Furthermore, Ethiopia is a member of the Like-Minded Mega Diverse Countries (LMMC), reflecting the country's exceptional biological richness including the endemic species. The biodiversity and associated community knowledge along with their ecosystems are described as follows.

2.1. Ecosystem Diversity

Ethiopian ecosystems had been classified by different authors at different times. One of such classifications had recognized the existence of 10 ecosystems (Friis *et al.*, 2010; IBC, 2009, EBI, 2014, 2015). According to Friis *et al.* (2010), Ethiopia's potential vegetation ecosystems follow a clear altitudinal gradient from the highest mountains to the lowland plains. At elevations above 3,200–3,500 meters, the Afroalpine ecosystems dominate, characterized by giant lobelias (*Lobelia rhynchopetalum*), tussock grasses, and cushion plants, and supporting unique fauna such as the Ethiopian wolf. Just below this zone lies the ericaceous belt, with dense thickets of *Erica arborea* and *Erica trimera*, which forms an important transitional vegetation before giving way to the Ethiopian montane grasslands that stretch across high plateaus and are heavily utilized for livestock grazing. Descending further, the Dry Evergreen Afromontane Forest and Grassland Complex covers much of

the central and northern highlands, comprising fragmented forests, wooded grasslands, and agricultural mosaics. In the wetter southwestern highlands, the Moist Evergreen Afromontane Forest occurs, harboring exceptionally high biodiversity and serving as one of the country's most important forest resources. In localized areas, these moist forests merge into the rare transitional rainforest, which links montane and lowland forest types. At lower elevations, the Combretum–Terminalia woodlands dominate the western and northwestern lowlands, while the drier eastern and southern lowlands are covered by the *Acacia (Vachellia) - Commiphora* woodlands, rich in drought-adapted trees and shrubs. Lastly, the desert and semi-desert scrublands occupy the lowest and driest regions of the country, supporting sparse vegetation adapted to extreme aridity. Complementing this upland-to-lowland zonation are the riverine forests, wetlands, lakes, and marsh ecosystems, which occur along rivers and basins across the country and provide critical refugia for biodiversity. Despite the efforts, the previous classifications overlooked important ecosystems such as agroecosystem, and hence a shift from a vegetation type to an ecosystem approach has been required.

The National Ecosystem Assessment Report of Ethiopia, which was based on the assessment frameworks of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), has clustered the previously ten ecosystems into five broad ecosystem categories (EBI, 2022). These five ecosystems are Mountain Ecosystem, Forest and Woodland Ecosystem, Aquatic and Wetland Ecosystem, Rangeland Ecosystem, and Agroecosystem. The alignment of previous ten ecosystems and the newly clustered ones is presented in Table 1.

Table 1: The alignment of previous ten ecosystems and the newly clustered five ecosystems

Previous Ecosystems		National ecosystem assessment classification				
		Mountain ecosystem	Forest and woodland ecosystem	Rangeland ecosystem	Aquatic and wetland ecosystem	Agro-ecosystem
1	Afro-alpine and Sub-afro Alpine	++++	+++	++	+	+
2	Montane Grass Land	++++	+++	++	+	++
3	Dry Ever-green Montane Forest and Evergreen Scrub	+++	++++	++	++	+++
4	Moist Montane Forest	+++	++++	+++	+	++
5	Vachellia- Commiphora	+	++++	++++	+	+
6	Combretum-Terminalia	-	++++	++++	+	++
7	Low land tropical (changed into Transitional Forest)	-	+++	+++	+	++
8	Desert and Semi-desert Scrubland	-	+	+++	++	+
9	Aquatic	++	+++	+++	++++	+
10	Wetland	++	+++	+++	++++	+

+ the degree of presence

- absent

2.1.1. Mountain Ecosystem

According to EBI (2022), mountain is defined as a landmass that has risen significantly above sea level from the surrounding area, forming altitudinally defined vegetation zones. In Ethiopia, the upper most vegetation zone, the Afro-alpine, is characterized by summer days and winter nights types of weather due to its remarkable diurnal variation of temperature (Hedberg, 1964). This ecosystem is more diverse than the surrounding

lowlands due to climatic and habitat diversity along the steep elevation. With regard to vegetation types, mountains exhibit three distinct zones, namely Afro-alpine, Ericaceous, and Afro-montane.

Afro-alpine vegetation

Afro-alpine is the uppermost vegetation belt of a mountain ecosystem. It is located above 3500 m a.s.l, and is characterized by remarkable diurnal variation of temperature. The Afro-alpine belt has different microclimates to which different species have adapted. It has rock outcrops, alpine lakes, open grassland, open stream banks and patches of *Erica arborea*, which are believed to be relics of the Quaternary period (McGuire and Kron, 2005).

Although the Pleistocene climate change has modified the vegetation zones of Ethiopian mountains, the Afro-alpine vegetation zone is an isolated island since the origin of the mountains themselves. The flora of the Afro-alpine vegetation includes geographically isolated vicarious taxa such as the giant lobelia (*Lobelia rynchopetalum*) that are renowned as the finches of the Galapagos Islands (Hedberg, 1969). The Afro-alpine belt also supports many wild animals, including species such as Walia Ibex (*Capra walie*), Mountain Nyala (*Tragelaphus buxtoni*), Ethiopian Wolf (*Canis simensis*), Gelada Baboon (*Theropithecus gelada*) and the giant mole rat. This ecosystem is also home to many birds, including endemic species such as Spot-breasted Plover, Blue-winged Goose, Black-headed Siskin, and Ankober Lark (IBC, 2009; Friis *et al.*, 2010). Furthermore, Afroalpine meadows harbor psychrophilic (cold-adapted) Cyanobacteria (e.g., Nostoc), crucial for nitrogen fixation at high elevations (Mengistu *et al.*, 2024). Stands of the endemic leguminous tree species, *Erythrina brucei*, in central Ethiopia show unique Rhizobia strains absent in cultivated legumes (Kebede *et al.*, 2024).

Status and trends

The Afro-alpine vegetation is under increasing pressure from growing human and livestock populations residing in the surrounding areas (EBI, 2022). Various efforts have been made

to reduce the impact of these pressures. For example, Afro-alpine area such as the Bale Mountains National Park (BMNP) is legally recognized and demarcated; management and business plans have been developed to support its effective stewardship. It is also registered as UNESCO's heritage site for more conservation attention. Conservation activities that include enhanced ecosystem-based approaches are undertaken in and around the BMNP.

Similarly, the Semien Mountains National Park (SMNP) is re-demarcated with an expansion of its boundaries. Activities focusing on poverty alleviation, environmental and natural resource management, and income generation for local communities have been undertaken in this park. Other community-managed protected areas of Afroalpine and Sub Afroalpine ecosystems, such as Menz Guassa and Abune Yosef have been formally demarcated and legalized as parks. Furthermore, ecosystem and wildlife research, biodiversity monitoring, and conservation initiatives have been underway. These efforts aim to mitigate human-wildlife conflict, strengthen traditional grassland management systems (e.g., in Menz Guassa), and raise awareness among farmers. As a result of these interventions, populations of threatened and endemic species such as the Walia Ibex (in SMNP) and the Ethiopian Wolf (in BMNP and Menz Guassa) have shown signs of recovery over time (EBI, 2015).

Ericaceous belt

Ericaceous belt is the second vegetation zone of a mountain ecosystem. It is found between 3200- 3400 m a.s.l., which is dominated by *Erica arborea*, the characteristic species of the vegetation belt. The Ericaceous vegetation zone occurring on the East African Mountains, including Ethiopia, forms a belt and is considered a refugia for the associated highland taxa. On some mountains, such as the Bale Mountains, there are pure stands of *Alchemilla haumannii* in a rather patchy distribution. Areas disturbed by the giant mole rat harbor species such as *Geranium* sp. and *Oreophyton falcatum* that are highly specialized to this highly disturbed habitat.

Status and trends

Ericaceous vegetation belt is prone to natural and anthropogenic factors. For instance, Alemu *et al.* (2012) reported a decrease in Ericaceous Forest by 12,660 ha (from 249,636 ha to 236,976 ha) in the Bale Mountains from 1986 to 2006. Fire has been reported as a major factor for the increase of the grassland replacing the Ericaceous vegetation. Land use/land cover change study by Aramde *et al.* (2014) on Choke Mountain from 1986 to 2011 showed that Ericaceous Forest decreased by 79%. Similar study by Birhanu *et al.* (2016) reported continuous decline of Ericaceous Forest on Mount Guna because of clearing for agriculture and open grazing that dates back to the early 1970s.

Afro-montane vegetation

Afro-montane vegetation is found at the lowermost zone of the mountain ecosystem stretching between 2500 m and 3200 m a.s.l. Afro-montane forests have served as stepping stones by forming Afro-montane Forest bridges to facilitate northward migration of certain species. Based on the moisture regime, two types of Afro-montane Forest are found at this zone. These are dry and moist Afro-montane forests. The dry Afro-montane Forest is characterized by plant species such as *Juniperus procera* and *Olea europaea* ssp. *cuspidata*. The moist Afro-montane Forest is comprised of characteristic species such as *Pouteria adolfi-friderici* and *Schefflera abyssinica*. At its most upper part, species such as *Hypericum revolutum* are dominant (EBI, 2022). Moist Afro-montane forests (e.g., Harena Forest) host ectomycorrhizal fungi, such as *Russula* and *Lactarius*, constituting 40% of root-associated microbes, in symbiotic association with *Hagenia abyssinica*.

Status and trends

In Ethiopia, Afromontane forests are experiencing significant deforestation and degradation, particularly due to agricultural expansion, overgrazing, and population growth. While some areas show signs of recovery through afforestation and participatory forest management, the overall trend indicates a decline in forest cover, impacting biodiversity and ecosystem services (Gower *et al.*, 2013).

A detailed altitudinal cross-section of the Simen Mountains reveals the presence of a relatively less disturbed Afro-montane vegetation in inaccessible slopes with increased ruggedness (Puff and Nemomissa, 2001). Both faces of the Simen Mountains are highly degraded due to settlement and agricultural expansion resulting in the continual shrinkage of the Afro-montane vegetation.

A study by Kidane *et al.* (2012) assessed the spatio-temporal land use/land cover change of the Bale Mountains ecoregion using satellite imagery of the period between 1973 and 2008. Findings of the study showed an overall decline in the formations of Afro-montane dwarf shrubs and herbaceous plants and a decrease in grassland cover by more than half from 19.3% in 1973 to 8.8% in 2008 in the Afro-montane grasslands.

The findings by Solomon *et al.* (2019) in Dry Afro-montane Forest of northern Ethiopia showed a decrease in ecosystem service values of water regulation, recreation, climate regulation, genetic resources, and erosion control services as a result of the decline in dense forest and open forest between 2000 and 2016. However, food production service value increased, which was mainly the result of an increase in the cultivated land within the study area.

2.1.2. Forest and Woodland Ecosystem

The forest and woodland ecosystem of the country comprises Dry Afromontane Forest and Grassland complex, Moist Evergreen Afro-montane Forest, Intermediate Evergreen Moist Afromontane Forest, Transitional Forest, Riverine Forest, *Vachellia-Commiphora* Woodland and Bushland, *Combretum – Terminalia* Woodland and Wooded Grassland, and the Wooded Grassland of the Western Gambella Region.

Dry Afromontane Forest and Grassland complex

The Dry Afromontane Forest and Grassland complex is situated between 1,600 and 1,900 and 3,300 m a.s.l (Friis *et al.*, 2010), covering extensive highland and mountainous areas in Oromia (Shewa, Arsi, Bale, Borena, and Harerge), Amhara (Gojam, Wello, and

Gonder), Tigray (East and West Tigray), as well as the highlands of Sidama, central, southern, and southwestern Ethiopia. These regions represent the core of Ethiopia's cereal-based sedentary agricultural zone, which has long been subjected to high human population pressure and extensive land conversion (EBI, 2015).

The areas have canopies usually dominated by *Juniperus procera* as a dominant species, followed by *Olea europaea* subsp. *cuspidata*, etc. *Afrocarpus falcatus* is also found in sheltered valleys (Friis *et al.*, 2010). Other trees and shrubs include *Carissa spinarum*, *Celtis africana*, *Ekebergia capensis*, *Euclea divinorum*, *Euphorbia ampliphylla*, *Prunus africana*, and *Rosa abyssinica*. Moist valley bottoms are often dominated by *Juniperus procera* and *Afrocarpus falcatus*, while degraded areas are typically colonized by secondary growth and shrub species. Common grass genera include *Hyparrhenia*, *Eragrostis*, *Panicum*, *Sporobolus*, and *Pennisetum* (EBI, 2015).

The Dry Afromontane Forest and Grassland complex supports a variety of wildlife, including iconic and threatened mammal species. Notable examples are the endemic and endangered Mountain Nyala (*Tragelaphus buxtoni*), as well as Leopard (*Panthera pardus*), Menelik's Bushbuck (*Tragelaphus scriptus*), Common Warthog (*Phacochoerus africanus*), Bohor Reedbuck (*Redunca redunca*), Olive Baboon (*Papio anubis*), Grey Duiker (*Sylvicapra grimmia*), and Spotted Hyena (*Crocuta crocuta*) (IBC, 2009; EBI, 2015).

The Dry Afromontane Forest and Grassland complex is also rich in bird species, including several endemic or near-endemic and globally threatened bird species. These include Harwood's Francolin (*Francolinus harwoodi*), Blue-winged Goose (*Cyanochen cyanopterus*), Yellow-fronted Parrot (*Poicephalus flavifrons*), Prince Ruspoli's Turaco (*Tauraco ruspolii*), Nechisar Nightjar (*Caprimulgus solala*), Abyssinian Catbird (*Parophasma galinieri*), Abyssinian Longclaw (*Macronyx flavicollis*), Black-headed Siskin (*Spinus notata*), Yellow-throated Seedeater (*Serinus flavigula*), and Ankober Serin (*Carduelis ankoberensis*) (IBC, 2009; EBI, 2014; EBI, 2015).

Status and trends

The Dry Afromontane Forest and Grassland complex is under severe threat from habitat conversion driven by deforestation for agricultural expansion, over exploitation of wood products particularly for fuel wood, and overgrazing. High population pressure and unsustainable land use practices, especially in the highlands, have led to extensive fragmentation and degradation of Dry Afromontane Forest and Grassland complex (EBI, 2014; EBI, 2015).

Regional governments have initiated various measures to improve ecosystem management. In various regions of Ethiopia, integrated soil and watershed management and area closure measures are being undertaken to rehabilitate the degraded areas (EBI, 2014). In Adaba-Dodola Woreda, Oromia, for instance, state forests have been allocated under concession arrangements and are managed jointly by government institutions and local communities through the Participatory Forest Management (PFM) approach. It aims to strengthen community involvement and responsibility in the sustainable management and protection of forest resources. As a result of such interventions, improvements in vegetation cover and associated wildlife populations have been observed in some areas. These arrangements include benefit-sharing mechanisms, carbon trading, and other incentive-based strategies (EBI, 2015).

Moist Evergreen Afro-montane Forest

Moist Evergreen Afro-montane Forest (MAF) is primarily found on the southwestern and southeastern plateaus of Ethiopia, occurring at elevations between 1500 and 2,600 meters above sea level (m.a.s.l). Its geographic distributions include southwestern part of the Ethiopian Highlands and the Haremma Forest at the southern slopes of the Bale Mountains (EBI, 2022). The canopy of Moist Evergreen Afro-montane Forest is dominated by *Pouteria adolfi-friderici*, *Olea welwitchii*, *Albizia gummifera* and *Albizia schimperiana* (Friis *et al.*, 2010; EBI, 2022). Other characteristic tree and shrub species in the Moist Evergreen Afro-montane Forest include *Coffea arabica*, *Cordia africana*, *Croton*

macrostachyus, *Erythrina brucei*, *Galiniera saxifraga*, *Ilex mitis*, *Polyscias fulva*, *Prunus africana*, *Maytenus harenensis*, *Rothmannia urcelliformis*, *Sapium ellipticum*, *Syzygium guineense*, and *Teclea nobilis* (Friis *et al.*, 2010; EBI, 2015).

Furthermore, the ground layer is dominated by herbaceous species of the genera *Acanthus*, *Justicia*, *Peperomia*, *Impatiens*, and *Urtica*, along with various grass species. In the wettest areas, epiphytes including *Canarina*, various orchids, *Scadoxus*, and ferns such as *Platyserium* and *Drynaria* are common, alongside abundant bryophytes, including mosses, and liverworts thriving in humid, shaded conditions. The Moist Evergreen Afro-montane Forest is known for its high levels of endemism. For instance, the Harenna Forest is home to endemic plant species such as *Solanecio harenensis* and is a hotspot of intraspecific diversity for wild *Coffea arabica* (EBI, 2015).

The Moist Evergreen Afro-montane Forest also supports a wide range of wildlife including larger mammals such as Lion (*Panthera leo*), Leopard (*Panthera pardus*), Serval Cat (*Leptailurus serval*), Common Jackal (*Canis aureus*), African Wild Dog (*Lycaon pictus*), African Wild Cat (*Felis lybica*), and Bush Pig (*Potamochoerus larvatus*) (EBI, 2014; EBI, 2015). It is also home of smaller endemic mammals, amphibians, and insects. Areas like Bonga, Metu-Gore-Tepi, and Tiro-Boyer-Becho support over 15, 16, and 32 highland bird species, respectively (EBI, 2015).

Status and trends

Human activities such as timber extraction, the expansion of commercial coffee and tea plantations, small-scale agriculture, livestock grazing, and human settlement all pose significant threats to the Moist Evergreen Afro-montane Forest. Also, illegal logging, firewood collection, and the unsustainable harvesting of non-timber forest products (NTFPs) all contribute to ongoing forest degradation (Friis *et al.*, 2010; EBI, 2015; EBI, 2022).

Various interventions have been put into place to address these pressures, mainly through Participatory Forest Management (PFM). Using this approach, government agencies and

local communities have collaborated to manage certain moist montane forest areas. Communities are organized and empowered to manage forest resources sustainably while also benefiting from NTFPs like honey, spices, and medicinal plants. These income-generating alternatives help reduce stress on the forest and support local livelihoods (EBI, 2015).

Furthermore, awareness-raising campaigns under PFM initiatives have encouraged voluntary resettlement from forested areas, resulting in a reduction in illegal timber harvesting and firewood collection. However, the lack of uniform, long-term ecological monitoring systems remains a major limitation, preventing comprehensive assessments of forest health and management effectiveness (EBI, 2015).

Transitional Forest

Transitional Forest (TRF) is found in the western parts of Ethiopia in Oromia (Wellega and Illubabor), Gambella (Godere and Abobo Forests) and in South West Ethiopia (Kafa, Bench-Skeko and Sheka). Characteristic plant species of Transitional Forest are *Manilkara butugi*, *Pouteria altissima*, *Pouteria alnifolia*, *Anthocleista schweinfurthii*, *Strychnos mitis*, *Ficus mucuso*, *F. exasperata*, *Milicia excelsa*, *Morus mesozygia*. Others species include *Trilepisium madagascariense*, *Alstonia boonei*, *Croton sylvaticus*, *Celtis toka*, *Diospyros abyssinica*, *Zanha golungensis*, *Lecaniodiscus fraxinifolius*, *Trichilia dregeana*, *Zanthoxylum leprieurii*, *Albizia schimperiana*, *A. grandibracteata* (Friis et al., 2010).

Status and trends

The Transitional Forest (TRF) is facing pressure emanating from settlements and agricultural expansions. Furthermore, indiscriminate fire, shifting cultivation by land clearing which is commonly performed through the slash and burn system have contributed to the shrinkage of the Transitional Forest. Consequently, many wild animals including large mammals such as antelopes are under threat. Parts of the TRF are inhabited by indigenous people and local communities that employ low input and output shifting cultivation practices, including root crops, until recently. In recent years, Transitional

Forest has been selectively logged and also deforested to give way to other land use types; some parts of this forest are being threatened due to settlement of refugees and large-scale farming and mining. Conservation measures that have been taken include formulation of forest legislations, preparation of management plan, establishment of conservation areas and implementing Participatory Forest Management (PFM).

Riverine Forest

Riverine Forest (RF) occurs along major systems of rivers and tributaries such as Abay (Blue Nile), Awash, Baro, Omo, Tekeze and Wabi and Shebele. Their tributaries have riverine forests in areas below approximately 1800 m altitude. Riverine forest vegetation is highly variable in structure and density, and the floristic composition is dependent on altitude and geographical location. Although the floristic composition of the riverine vegetation varies depending on altitude and geographical location, in general, it is mainly characterized by species like *Trema orientalis*, *Celtis africana*, *Mimusops kummel*, *Oncoba spinosa*, *Tamarindus indica*, etc. There are a considerable number of species of woody plants that are only recorded from riverine forest in Ethiopia, and typical trees in riverine forests include *Acacia polyacantha*, and *Breonadia salicina*.

Status and trends

Riverine vegetation in Ethiopia is facing significant pressures, with a general trend of degradation and shrinking due to various anthropogenic and environmental factors. While some areas show signs of secondary regeneration, many riverine forests are experiencing a decline in species diversity and overall health. Deforestation and land use change are increasing in the head-waters and watersheds of this riverine vegetation due to utilization of river water for hydro-electricity generation. For example, this vegetation is under heavy exploitation along the Awash River in Afar area (Devi *et al.*, 2008).

Vachellia-Commiphora Woodland and Bushland

Vachellia-Commiphora Woodland and Bushland (VCB) is found between 400 and 1,900 m a.s.l. (Fris *et al.*, 2010), and occurs in the northern, eastern, central and southern part of the country (EBI, 2015; EBI, 2022). The characteristic woody species of *Vachellia-*

Commiphora Woodland and Bushland include *Senegalia senegalensis*, *Vachellia seyal*, *V. tortilis*, *V. mellifera*, *Boswellia microphylla*, *B. neglecta*, *Balanites aegyptiaca*, *Commiphora africana*, *C. myrrha*, *C. boranensis*, *C. ciliata*, *C. monoica* and *C. serrulata* (Friis *et al.*, 2010; EBI, 2015).

Vachellia-Commiphora Woodland and Bushland is home to different wild mammals such as Swayne's Hartebeest (*Alcelaphus buselaphus swynei*), Lesser Kudu (*Tragelaphus imberbis*), Greater Kudu (*Tragelaphus strepsiceros*), African Wild Ass (*Equus africanus*), Grevy's Zebra (*Equus grevyi*), Waterbuck (*Kobus ellipsiprymnus*), Serval Cat (*Leptailurus serval*), African Bush Elephant (*Loxodonta africana*), African Buffalo (*Syncerus caffer*), Dibatag (*Ammodorcas clarkei*), and Gerenuk (*Litocranius walleri*). The characteristic birds in *Vachellia-Commiphora Woodland and Bushland* include Ostrich (*Struthio camelus*), Hunter's Sunbird (*Chalcomitra hunteri*), Shining Sunbird (*Cinnyris habessinicus*), Golden-breasted Bunting (*Emberiza flaviventris*), Salvadori's Seed Eater (*Serinus xantholaemus*), Yellow-throated Seed Eater (*Serinus flavigula*), Ruppell's Weaver (*Ploceus galbula*), White-headed Buffalo Weaver (*Dinemellia dinemelli*), Golden-breasted Starling (*Lamprotornis regius*), White tailed Swallow (*Hirundo megaensis*) and Stresemann's Bush Crow (*Zavattariornis stresemanni*) (EBI, 2015).

Status and trends

Large-scale commercial agriculture for sugar cane, cotton, and biofuel plantations is the primary development activity in the *Vachellia-Commiphora Woodland*. Crop cultivation (Figure 2), particularly in agropastoral areas, is a relatively recent development that contributes to land degradation and biodiversity loss (EBI, 2014; EBI, 2015; EBI, 2022).

Furthermore, intensive firewood collection and charcoal making, expansion of invasive alien species such as *Prosopis juliflora* and *Lantana camara*, (especially in Eastern Ethiopia) have contributed to the loss of species diversity and habitat degradation in *Vachellia-Commiphora Woodland and Bushland*. Similarly, Woody species encroachment in the Borena lowlands has been deteriorating, leading to habitat loss that directly affects

species diversity. However, measures are being taken to minimize or halt the invasion, especially that of *Prosopis juliflora* from rangelands. The state of disturbance of these protected areas varies from low to moderate. Conservation efforts made to designate some protected areas and re-demarcation activities for Awash and Abijata-Shalla National Parks are other activities that are carried out to ensure effective management (EBI, 2014; EBI, 2015).

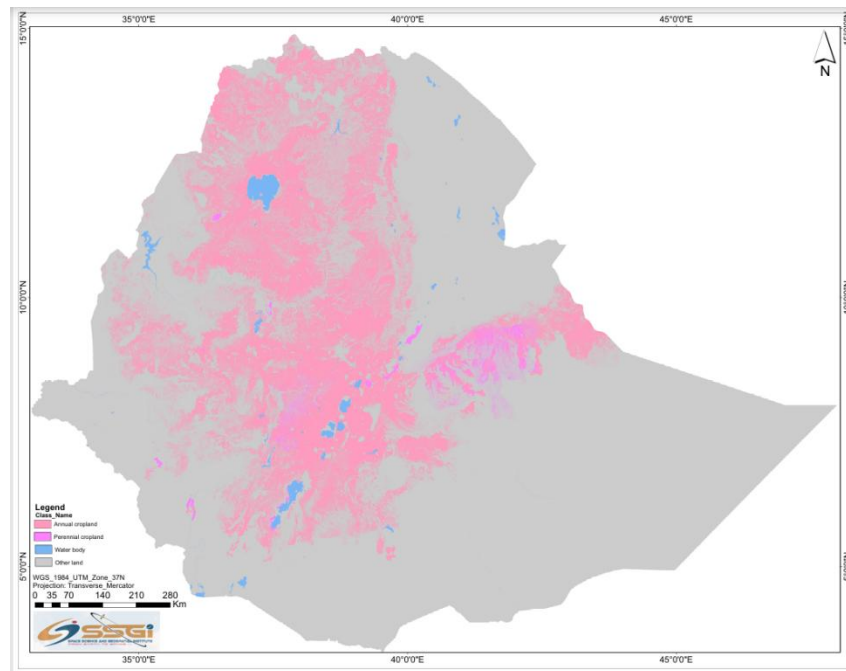


Figure 2: Ethiopian Agricultural Land (Source: SSGI, 2022)

Combretum-Terminalia Woodland and wooded Grassland

Combretum-Terminalia Woodland and Wooded Grassland occurs between 500 and 1,900 m a.s.l. It occurs in Tekeze valley, western parts of Benshangul-Gumuz and North to the village of Gelego and south of Metema (EBI, 2015; EBI, 2022). It comprises characteristic plant species of small to moderate sized trees with fairly large deciduous leaves. These include *Anogeissus leiocarpa*, *Boscia minimifolia*, *Boswellia papyrifera*, *Cadaba ruspolii*, *C. rotundifolia*, *Capparis tomentosa*, *Combretum aculeatum*, *C. collinum*, *Terminalia orbicularis*, *Oxytenanthera abyssinica*, *Stereospermum kunthianum* and *Terminalia laxiflora* (Friis *et al.*, 2010; EBI, 2022).

Combretum-Terminalia Woodland and Wooded Grassland supports various wild mammals such as Swaynes' Hartebeest (*Alcelaphus buselaphus swynei*), Tiang (*Damaliscus korrigum*), Grant's gazelle (*Gazella granti*), Greater Kudu (*Tragelaphus strepsiceros*), and Lesser Kudu (*Tragelaphus imberbis*), Gerenuk (*Litocranius walleri*), Lion (*Panthera leo*), Leopard (*Panthera pardus*), Giraffe (*Giraffa camelopardalis*), African Bush Elephant (*Loxodonta africana*), African Buffalo (*Syncerus caffer*), Cheetah (*Acinonyx jubatus*) and Oryx species. The bird species of *Combretum-Terminalia* Woodland and Wooded Grassland include Fox Kestrel (*Falco alopex*), Ostrich (*Struthio camelus*), Red-pate Cisticola (*Cisticola ruficeps*), Green-backed Eremomela (*Eremomela canescens*), Bush Petronia (*Petronia dentata*), and Black-rumped Waxbill (*Estrilda troglodytes*) (EBI, 2015).

Status and trends

Encroachment and expansion of small- and large-scale agriculture for crops such as sugar cane, cotton, sesame, rice and bio-fuel plantations are aggressively undertaken in the *Combretum-Terminalia* Woodland and Wooded Grassland. Furthermore, overgrazing and shifting cultivation are deteriorating the *Combretum - Terminalia* Woodland and Wooded Grassland. Consequently, many wild animals including Lion, Cheetah, Giraffe and Buffalo and plant species such as *Vitellaria paradoxa*, *Oxytenanthera abyssinica*, and *Boswellia papyrifera* are under threat (EBI, 2014; EBI, 2015).

Various conservation measures, including tree planting, implementation of PFM, awareness raising, demarcation and designation of protected areas such as Alatish, Qafta Shiraro and Gambella National Parks have been undertaken to address the threats (EBI, 2015).

Wooded Grassland of the Western Gambella Region

The Wooded grassland of the western Gambella Region (WGG) occurs between 450-500 m a.s.l. and is a dominant vegetation in Gambella Region. Floristically, wooded grassland of the western Gambella Region has low diversity of woody plants and few species that are unique to this vegetation type (Friis *et al.*, 2010). Moreover, this vegetation type is mainly

characterised by its physiognomy and herbaceous flora, especially the grass species, rather than by its woody species. This vegetation is characterized by a tall grass stratum that burns annually, and a canopy layer of trees that can tolerate burning and temporary flooding with the grass stratum dominated by the genera *Hyparrhenia* and *Oryza*. The trees in the grassland of the western Gambela Region include *Acacia (Vachellia) seyal*, *A. (Vachellia) nilotica*, *Balanites aegyptiaca*, *Hyphaene thebaica* and *Borassus aethiopum* (Friis *et al.*, 2010). The savanna woodlands of Gambela also maintain *Bradyrhizobium*-dominated soils with 25% relative abundance linked to *Acacia* root nodules (Tesfaye *et al.*, 2024).

Status and trends

Wooded Grassland of the western Gambela region, which was recognized as part of the Ethiopian biodiversity hotspot areas is among the most threatened vegetation due to Habitat fragmentation. Deforestation and fragmentation through the rapid expansion of farmland following settlement, private investment, excessive cutting of trees for firewood and construction and forest fire has devastated the vegetation (Awoke *et al.*, 2018). This implies that virtually all these unique habitats and associated biodiversity are facing significant threats due to both natural and anthropogenic factors. Overgrazing has resulted in the deterioration of such wooded grasslands. Recent decades have witnessed an unprecedented scale of immigration from highlands through resettlement programs, which continued to cause large-scale conversion of the "woodlands" into croplands.

2.1.3. Rangeland Ecosystem

Rangelands are defined as uncultivated areas of land that provide the necessities of life for grazing and browsing animals and other essential ecosystem services (EBI, 2022). The Ethiopian rangelands are found mainly in the major pastoral areas of Somali and Afar Regions, Borana and Bale lowlands of Oromia Region as well as in the South Omo Zone of the South region of Ethiopia. Rangelands, besides their role in providing the feed base for grazing and browsing livestock, deliver other important services such as regulating water flow along catchments, acting as biodiversity reserves, and serving as carbon sinks to mitigate greenhouse gas emissions. Rangelands are essential to the livelihood of

pastoralists and agro-pastoralists and they are capable of conserving ecosystem services, promoting wildlife conservation, and honoring cultural values and traditions (Neely *et al.*, 2009). Traditionally, rangelands are used for extensive livestock production, tourism, forestry and other livelihood activities. They play important roles in livestock production in Ethiopia. The Ethiopian rangelands harbor most of the goats, and the camel population of the country and support pastoral and agro-pastoral communities of about 15 million people (Shitarek, 2012). The livestock resources have significant economic and social importance at the household levels, and these make significant contributions to the national economy and foreign currency earnings of the country.

The major pastoralists in Ethiopia are the Afar in the northeast, the Borana Oromo in the south, and the Somali in the east and southeast of the country (Desta & Coppock, 2004; Admasu *et al.*, 2010). In addition, there are also less-expansive ethnolinguistic indigenous and local communities, such as the Hamar, Arbore, Surma and Dassenetch who live in the South Ethiopia Region and the Kereyu (Oromo) pastoralists in central Oromia (Coppock, 1994; Abule *et al.*, 2005b; Napier & Desta, 2011). This ecosystem includes the desert and semi-desert scrub land vegetation type, where it embraces the Dallol Depression, with its hyperacidic (pH~0), hypersaline (>30% salinity), and hyper-thermal (>90°C) pools hosting a remarkable specialized microbiome. The Archaea, prokaryotic organisms, dominate this system, including thermoacidophilic, *Acidianus* spp., that oxidize sulfur at pH <1 and possess unique sulfur-metabolizing gene clusters not found in other global extremophiles (Gomez *et al.*, 2019). Equally fascinating are the Nanohaloarchaea, ultra-small archaea (200-300 nm) with reduced genome adapted to energy-limited conditions, representing up to 25% of the microbial community of the area (Humm *et al.*, 2023).

Status and trends

The gradual decrease of seasonal mobility between wet and dry season grazing areas, coupled with increasing livestock and the human population, has created pressure on the already fragile rangeland ecology due to overgrazing. Due to the expropriation of dry season grazing and watering areas, the wet season grazing areas are continuously grazed

throughout the year, leading to severe degradation which is manifested in terms of loss of vegetation cover and soil erosion. Soil erosion has become a serious problem in areas that are exposed to constant trampling by animals which destroys the soil structures and aggravates water runoff. In Borana, soil erosion is severe around Surupa and Fichawa areas, leading to the formation of gullies in many places. The result is a lack of adequate vegetation cover and a decline in animal productivity. The rangeland ecosystem has long been threatened by land use/land cover change, bush encroachment and expansion of invasive alien species.

Rangeland closure is one of the rangeland management strategies practiced by pastoralists to cope with the decline in forage quality and quantity and conserve forage resources. For example, there are different forms of rangeland closures such as different forms of *Kalo* management. The *Kalo* system in Borana for example could be a private enclosure, cooperative enclosures and government-initiated ones traditionally practiced by pastoralists to manage their rangelands (EBI, 2022). In a farming community, for example in Gamo, *Kalo* is a system of traditional pasture land protection. '*Kalo*' means satisfaction in Gamo language. It is a tradition in which a communal pasture land is kept free from grazing by any livestock for 3 months from June to August 30 every year. In September, during the Meskel festival, with the blessings by the traditional leaders, the pasture land is opened for the livestock to graze (Figure 3). The tradition is that as the Meskel festival is time of joy for the humans, the livestock have to enjoy at the same time. Cultivation of that land causes condemnation and no one dares to use tools on that land. This is a system that ensures that the area is properly protected, the pasture land rests and then and continues to provide benefits and is implemented in the same way every year. This system is also beneficial for cultural development and environmental protection. Traditional activities are also carried out in these areas, including horse riding. Since the area is maintained in the same way for years, this system helps the area to recover (Personal Communication, Head of Forest and Environment, Gamo Zone).



Figure 3: Livestock grazing on regenerated communal pasture during Meskel festival (photo credit: Dikire)

2.1.4. Aquatic and Wetland Ecosystem

Aquatic environments are areas covered by open-water bodies. In Ethiopia, they include rivers, lakes and reservoirs found in different climatic/ecological zones of the country,

which all together are estimated to cover a surface area of 11,896 km² (Mekbib *et al.*, 2022). The characteristic plant species in the freshwater lakes include floating aquatics such as native *Lemna aequinoctalis*, *L. gibba*, *L. minor*, *Wolffia murrhiza*, *Pistia stratiotes*, *Eichhornia crassipes* and *E. natans*. In addition, there are several phytoplankton species such as *Aphanothece microspora*, *Chroococcus disperses*, *Closterium* spp., *Meliorosa granulata*, *Microcystis aeruginosa*, etc. (Friis *et al.*, 2010). Characteristic species of saline lakes include species of the family Chenopodiaceae, and phytoplankton, mainly consisting of cyanobacteria (blue-green algae), such as *Anabaenopsis* spp., *Anomoeoneis sphaerocarpa*, *Oscillatoria* spp. and *Spirulina platensis*. Aquatic environments also harbor phytoplankton, including many other important blue-green algae such as *Arthrospira* spp. (Friis *et al.*, 2010).

The Ethiopian wetlands, on the other hand, refer to a variety of inland water systems that embrace marshy areas, freshwater swamp lands, flood plains, and artificial ponds (ENHS, 2018). Marshes are restricted to those wetlands that are dominated by grasses, rushes, reeds, sedges and other herbaceous plants, while swamps often also contain low woody vegetation (shrubs and trees) in addition to the wetland vegetation. Swamps and marshes are two dominant types of wetlands in Ethiopia, both together covering an estimated area of 1,803 km² which is about 0.16% landmass of the country (Mckee, 2007 as cited in Mekbib *et al.* 2022). The characteristic species in Freshwater marsh/swamp, floodplain and lake shore vegetation along the shores of fresh water lakes include the sedges such as *Cyperus digitatus*, *C. denudatus*, *C. dichroostachys*, *C. elegantulus*, *C. latifolius* and *Ascolepis capensis*, as well as other herbs, including *Juncus dregeanus*, *Floscopa glomerata*, *Syngonanthus wahlbergii*, *Xyris capensis*, *Persicaria decipiens*, *Ranunculus multibus*, *Plectranthus punctatus*, and *Nymphaea lotus*. Characteristic woody species include *Phoenix reclinata*, *Lannea edulis*, *Aeschynomene cristata var. pubescens*, *A. elaphroxylum*, *A. pfundii* and *A. schimperi*. The vegetation in saline wetlands is characterized by *Suaeda monoica*, and herbaceous species of *Atriplex* spp. and *Salicornia* spp. (Friis *et al.*, 2010). Tree species include *Ficus sycomorus*, *Tamarindus indica*, *Celtis*

africana, *Mimusops kummel*, *Syzygium guineense*, *Terminalia brownii*, *Vachellia polyacantha*, *Kigelia abyssinica*, *Phoenix reclinata*, *Trichilia* spp. and *Diospyros* spp.

Some birds, for example, Spot-breasted Plover, Blue-winged Goose, Rouget's Rail, White-winged Flufftail, Wattled Crane, Corn Crake, Shoebill, Black-winged Pratincole, Great Snipe, and Lesser Flamingo in general favor, feed and/or breed in wetlands. These areas are threatened by water draining, invasive alien species, pollution, siltation, climate change (EBI, 2022; Mekbib *et al.*, 2022).

Status and trends

The Aquatic and wetland ecosystem is degrading at rapid rate due to the over exploitation of the resources by human activities such as excessive water abstraction, conversion of wetlands to other land use types, pollution, invasive alien species, overgrazing and siltation. As a result, biodiversity in aquatic and wetland ecosystem is rapidly declining (ENHS, 2018). In addition, the wetland community knowledge systems and their contribution toward conservation and wise use of the resources are declining. The human and livestock population growth and lack of national policy that recognizes the values and benefits of wetlands and aquatic resources are the underlying factors affecting aquatic and wetland ecosystem. However, the growing number of man-made reservoirs such as Gibe III, Tekeze dam, Great Ethiopian Renaissance Dam (GERD) have increased the area coverage of aquatic and wetland ecosystem cover of the country. For example, the GERD alone increases the area of aquatic and wetland ecosystem of the country by 1,874 km². Some examples of wetlands and lakes that show decreasing and increasing trends, attributed to factors stated above are presented below as Figures 4, 5 and 6.

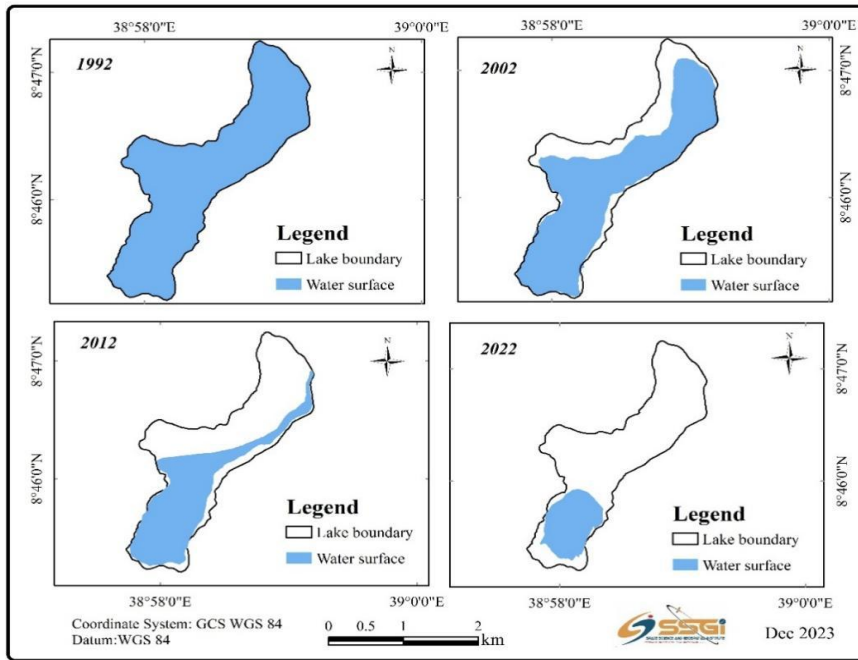


Figure 4: Lake Chelekleka time series map (Source: SSGI, 2025)

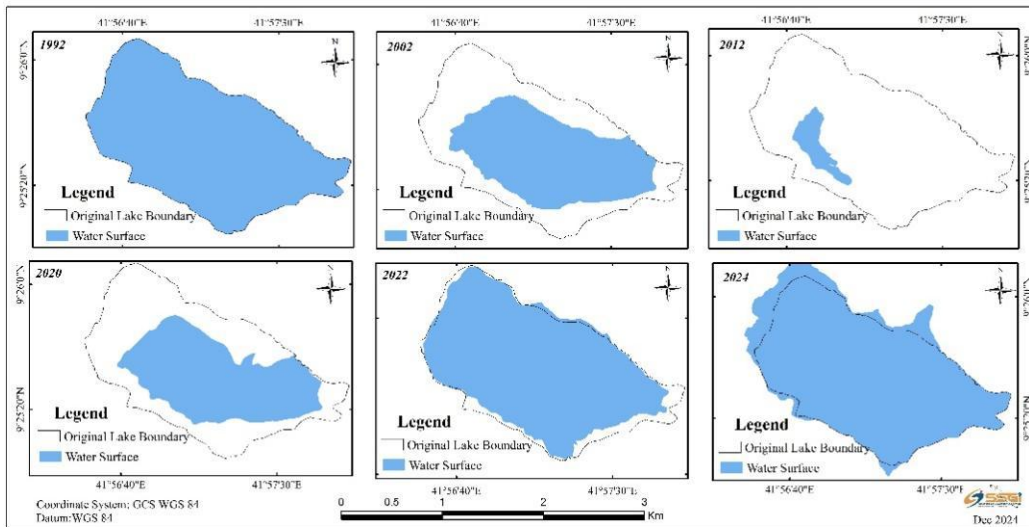


Figure 5: Lake Adele time series map (Source: SSGI, 2025)

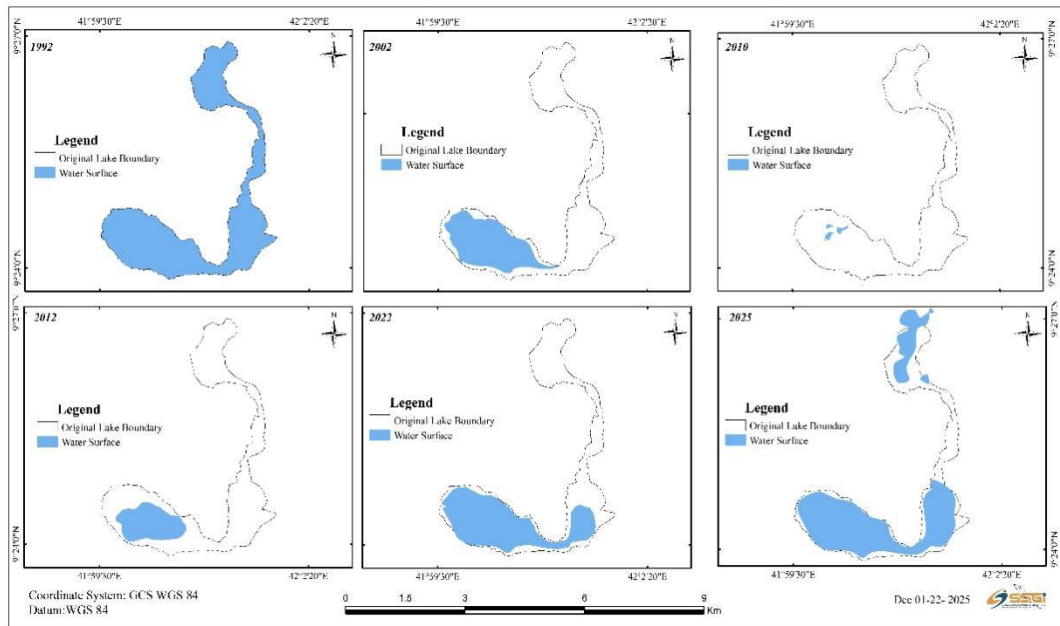


Figure 6: Lake Haromaya time series map (Source: SSGI, 2025)

2.1.5. Agroecosystem

The Agroecosystem is essentially the biophysical and human components and interactions where ecological principles govern the system; being guided by farmers’ ‘decision-making’ processes and actions. Agroecosystem includes any region that is impacted by agriculture (Anon, 1996) and which usually results in changes by simplifying the ecological niches. The agroecological zonation in Ethiopia evolved from the traditional agro-ecological classification to the current science-based climatic criteria classification, which has resulted in 32 major agroclimatic zones (EIAR, 2011). These agroecological zones harbour diverse agrobiodiversity in the different agricultural practices and farming complexes. The agroecosystem sub-types within these zones have sustained the biophysical and indigenous sociocultural assets of the area with the characteristic agrobiodiversity, mainly the rich crop and livestock genetic resources that came under dynamic state being impacted by natural and human-induced pressures. In addition, the diverse organisms within the ecosystem

play a variety of roles at different scales, including nutrient cycling, pollination, pollution and sediment regulation, disease and pest control, erosion control, hydrological cycle maintenance, climate regulation and carbon sequestration. The agroecosystem sub-types of Ethiopia are unique in being situated within a Vavilovian center of origin and/or diversity of crop species/varieties and livestock species/ breeds. The types of crops cultivated and livestock breeds reared in the different localities of Ethiopia are determined by the agroecological conditions of the sites, and also the cultural preferences of the people living in the areas. The agroecosystem also hosts various domesticated legume species including fava bean (*Vicia faba*), haricot bean (*Phaseolus vulgaris*), and chickpea (*Cicer arietinum*), with unique rhizobial strains of microbes, 30% of them showing no genetic match to global databases (Girma *et al.*, 2024). Ethiopia has 14 major agroecosystem sub-types that can be grouped into three categories, namely 1) Pastoral and agropastoral systems, 2) Cereal crop-based systems and 3) Perennial crop-based systems or Enset and vegiculture complex.

Status and trends

Agroecosystem and their services to human wellbeing are seriously affected by natural and anthropological drivers resulting in disasters identified to have significant effects on biodiversity for food and agriculture due to climate change which contributes to recurrent droughts, floods and acidification, among others. Crop and livestock varieties/landraces and breeds that are contributing to humanity's welfare are declining and the many wild useful plant species and orphan crops that could improve food security and livelihood systems of the people remain underutilized and vulnerable. They are also highly vulnerable to the spread of invasive alien species, which negatively affect crop and livestock production and productivity as well as human health. Unsustainable utilization of agroecosystem resources either in the form of overexploitation or excessive use of nutrients with dire consequences of soil erosion, water depletion, acidification and salt accumulation are significantly affecting the productivity and sustainability of the country's diverse agroecosystem types. Indigenous knowledge of agrobiodiversity and agroecological

farming, held in the oral literature, is threatened due to lack of proper documentation, valorization and socio-economic transformation, which require taking on board through continued sustainable development initiatives.

For example, a case study made in the Tigray region showed that 133 (91.10%) crop varieties were reported to have been lost mainly because of replacement by improved varieties (Reda and Mesfin, 2017). The loss of breeds of animals through indiscriminate cross-breeding and replacement are other phenomena in the agroecosystem. The paradigm shifts in the production system and land fragmentation situation forced the transformation of transhumance way of livestock management to sedentary farming which is the cause for the decline in the livestock population size at the household level, increased admixtures and replacement of recognized breeds. Additional threats emanate from cross-breeding, interbreeding, diseases and parasites, shortage of water, and poor housing. Particularly, the gene pool of indigenous chicken breeds is under pressure from replacement by pure exotics and their hybrids (IBC, 2012b). Furthermore, vegetation loss, diseases and pests, predators, and pesticide and herbicides (IBC, 2005; 2012) threaten honeybee species in the country.

2.2. Plant Genetic Resources

Ethiopia has diverse plant species that are distributed in different vegetation types. The higher plants are estimated at over 6000 species, 10% of which are endemic to the country (Sebsebe and Ensermu, 2014). The plant biodiversity comprises both wild and cultivated plants which vary in their growth forms, composition and habitats. In their distribution range, some are distributed over a wide range of landscapes, while others are found in specific or restricted areas. Ethiopia is considered, one of the Vavilonian centers of origin and diversity for various crop genetic resources in the world, mainly due to the country's diverse agroecological settings and farmers' selection practices.

2.2.1. Crop genetic resources and their wild relatives

Ethiopia is recognized as one of the centers of origin for various field and horticultural crops, and their wild relatives. Among these are tef (*Eragrostis tef*), coffee (*Coffea arabica*), enset (*Ensete ventricosum*), noug (*Guizotia abyssinica*), and Ethiopian mustard (*Brassica carinata*). These species evolved under the country's unique agroecological conditions and farmers' selection.

Ethiopia is also a secondary center of diversity for many crops that were introduced from other regions but have since diversified within the country. These include barley (*Hordeum vulgare*), durum wheat (*Triticum durum*), and sorghum (*Sorghum bicolor*) with wide agroecological adaptability. Ethiopia also harbours diverse landraces of pulses like chickpeas (*Cicer arietinum*), lentils (*Lens culinaris*), faba beans (*Vicia faba*), and grass peas (*Lathyrus sativus*), which continued to evolve for centuries. The extensive intra-species variation observed in these crops underlines Ethiopia's significance as a global reservoir of crop genetic diversity.

Field crop genetic resources

Tef, sorghum, wheat, barley and maize are the major cereals grown in the country. Significant genetic diversity exists in tef (*Eragrostis tef*) which enables it to be adapted to various agro-ecological conditions. Many wild *Eragrostis* species including *Eragrostis pilosa*, *E. aethiopica*, *E. bicolor*, *E. cilianensis*, *E. curvula*, *E. minor*, *E. papposa* and *E. exicana* which are believed to be close relatives or progenitors of the cultivated tef exist in Ethiopia (Aseffa *et al.*, 2015). Four morphological farmers' varieties of *Sorghum bicolor* (bicolor, guinea, caudatum and durra) are grown and adapted to different agro-ecological conditions in Ethiopia. Many of the intermediate forms as well as several of the wild and weedy forms such as *S. arundinaceum* and *S. aethiopicum* are also found in the country. Similarly, wide variations exist for wheat and barley germplasm and they are known for agronomically important traits including adaptation to abiotic and biotic stresses such as drought and disease resistance. In addition, farmers' varieties have greater performance in

terms of biomass production and yield under marginal conditions (EBI, 2015). The genus *Hordeum* contains about 32 species and within the species *Hordeum vulgare*, there are endemic varieties that evolved in Ethiopia and have not been reported from elsewhere. The presence of high level of variation in morphology and phenology among barley farmers' varieties grown by smallholder farmers is reported (Zewdu *et al.*, 2025). Wide variation exists also for tetraploid wheat (*Triticum turgidum* subsp. *durum*, *T. turgidum* subsp. *abyssinicum*, *T. dicoccum*, *T. polonicum* and *T. compactum*) and the hexaploid wheat (*Triticum aestivum*). There are also wild/weedy tetraploid oat species (*Avena abyssinica* and *A. vaviloviana*) which are endemic to Ethiopia. *A. abyssinica* is cultivated in northern Ethiopia and is also a weed on the arable lands, particularly in barley fields. Similarly, *Oryza barthii* and *O. longistaminata* are the wild relatives of rice that are found in the western plains and around Lake Tana, respectively (Park, 2013).

Ethiopia is also a center of diversity for many pulse crops and the presence of high diversity in various traits is reported for faba bean, chickpea, lentil, grass pea, cowpea and field pea. A unique subspecies of field pea known as *Pisum sativum* subsp. *abyssinicum* has evolved in Ethiopia and wild and primitive forms of field pea are also known to exist in the higher elevations of the country. *Lathyrus pratensis* and *L. sphaericus* which are wild relatives of grass pea are found in upland grasslands of the country. *Lablab purpureus* subsp. *unciatus*, the wild and sometimes cultivated sub species of *Lablab purpureus*, and *Vigna vexillata*; a relative of cowpea, are found in many parts of the country. *Lens ervoides*, the wild relative of lentil, is found in north and central Ethiopia and *Cicer cuneatum*, the wild relative of chickpea, is found in northern Ethiopia.

Ethiopian mustard (*Brassica carinata*), noug (*Guizotia abyssinica*), sesame (*Sesamum indicum*) and linseed (*Linum usitatissimum*) are oil seed crops for which Ethiopia is considered a center of origin or diversity. Six Brassica species (*B. campestris*, *B. carinata*, *B. integrifolia*, *B. juncea*, *B. nigra* and *B. oleracea*) are cultivated in Ethiopia.

Although there are no completely wild species of *Brassica*, there exist weedy forms in the highland areas of the country. Similarly, *Guizotia* has a wild relative (*G. scabra*) that often

grows in the same fields with cultivated *G. abyssinica*. *Sesamum indicum* is also found in wild state. Other species such as *S. latifolium*, *Linum holstii*, *L. keniense*, *L. strictum* and *L. trigynum* var. *sieberi* are among the reported wild relatives of *Sesamum* and *Linum* that grow in Ethiopia.

Similarly, there are indigenous cultivated and wild species of cotton. *Gossypium herbaceum* var. *acerifolium* is believed to be domesticated in Ethiopia. The indigenous cultivated species *G. arboreum* and *G. herbaceum* are grown in home gardens and are important in traditional handicrafts. *G. anomalum* subsp. *senarense*, *G. somalense*, *G. bricchettii* and *G. benadirensis* are wild relatives of cotton found in the country (EBI, 2014; EBI, 2015).

There are also neglected/underutilized crops which are not widely grown by farmers in Ethiopia. These include Finger millet (*Eleusine coracana*), Pearl millet (*Pennisetum glaucum*), Emmer wheat (*Triticum dicoccum*), Pigeon pea (*Cajanus cajan*), Hyacinth bean (*Lablab purpureus*), Fenugreek (*Trigonella foenum-graecum*), Lupin (*Lupinus albus*) and Yam (*Dioscorea* sp.).

Status and trends

Attributed to different factors, the number of farmers' varieties maintained by farmers is decreasing over time. In Tigray region, for example, farmers' varieties of wheat ('Shehan', 'Gerey' and 'Gomad'), barley ('Demhay' and 'Gunaza') and sorghum ('Gedalit') are among the varieties reported to have been lost due to climate change and replacement by high yielding ones. Durum wheat is a seriously threatened crop from loss of diversity on farmers' fields.

Rare occurrence of durum wheat farmers' varieties during the main growing season is reported by EOSA (2007) from its survey in selected zones (West Shewa, Sidama and Arsi). The main reason for this is displacement by bread wheat varieties which took place gradually over a period of three decades. Studies on sorghum in northeastern Ethiopia have also shown that some important farmers' varieties have disappeared either locally or

regionally in 30 years' time, and many other farmers' varieties have become marginalized (Hailemichael *et al.*, 2008).

The factors affecting the state of field crop genetic resources include displacement of farmers' varieties by improved ones, shift to market-oriented crop production, diseases and pests, frequent drought, and unreliable rainfall. The latter affects not only farmers' varieties but also improved ones.

Most of the crop wild relatives are found growing as weeds on marginal fields, traditionally managed agricultural lands and in disturbed habitats such as roadsides. The natural populations of many species of crop wild relatives are increasingly at risk. They are threatened primarily by habitat loss, degradation and fragmentation. In addition, climate change is posing significant impacts on species distributions through reducing suitable habitat and increasing the rate of habitat fragmentation (Deressa T. *et al.*, 2009).

In order to conserve and promote sustainable utilization, Ethiopian Biodiversity Institute (EBI) has preserved different field crops in cold room. To promote on-farm conservation activities, over 53 community seed banks have been established across different regions of the country. The community seed banks obtain technical support from EBI, The Regional Bureaus of Agriculture and Environmental Protection Authority and various development partners. These seed banks are intended to enhance the access to diverse crop genetic resources and contribute to local seed security.

Horticultural crop genetic resources

Horticultural plant species grown in Ethiopia include root and tuber crops, fruits and vegetables, stimulant and beverage, and herbs and spices. The most important root and tuber crops of Ethiopia are enset (*Ensete venricosum*), anchote (*Coccinia abyssinica*), Ethiopian potato (*Plectranthus edulis*) and yams (*Dioscorea spp.*).

Anchote, enset and Ethiopian potato are found both in cultivated and wild states. There is tremendous variation among enset varieties in morphological characters, disease

resistance, product qualities and use value. In Ethiopia, the genus *Plectranthus* has 32 species. Among these, *P. garckeanus* is endemic to the country. Out of the ten species of *Coccinia* that are found in Ethiopia, only *C. abyssinica* is cultivated for human consumption. Other root crops that occur in the country include taro (*Colocasia esculenta*), tannia (*Xanthosoma saquitifolium*), cassava (*Manihot esculenta*), potato (*Solanum tuberosum*) and sweet potato (*Ipomoea batatas*). Potato and sweet potato have limited intra-specific diversity while taro and tannia are naturalized and diversified.

About 38 fruit plant species are cultivated in Ethiopia. Among these, pineapple (*Ananas comosus*), papaya (*Carica papaya*), sweet orange (*Citrus sinensis*), mango (*Mangifera indica*), banana (*Musa paradisca*) and avocado (*Persea americana*) are naturalized to the Ethiopian agro-ecologies and have many varieties (IBC, 2012a).

Widely cultivated vegetable species include pepper, garlic, shallot, tomato, cabbage, carrot, beetroot, pumpkin and okra. Okra (*Abelmoschus esculentus*) is believed to be domesticated in Ethiopia and has high diversity and its wild relative, *A. ficulneus*, is found in western Ethiopia. Cabbage tree (*Moringa stenopetala*) is another important vegetable indigenous to Ethiopia with multiple values such as food, feed, medicine and shade.

The most important stimulant and beverage species that are found in Ethiopia are coffee (*Coffea arabica*), chat (*Catha edulis*), tea (*Camellia chinensis*) and shiny-leaf buckthorn (*Rhamnus prinoides*). Arabica coffee in Ethiopia has enormous phenotypic diversity in both quantitative and qualitative characters. There is an extremely high variability in disease and pest resistance, liquoring quality, caffeine content and other traits. Reports (Engels and Hawkes, 1991; IBC, 2012a) indicate that Ethiopia is either a center of origin or diversity for spices like Ethiopian cardamom (*Aframomum corrorima*), long pepper (*Piper longum*), black cumin (*Nigella sativa*), cumin/bishop's weed (*Carum copticum*), coriander (*Coriandrum sativum*), thyme (*Thymus schimperi*) and fenugreek (*Trigonella foenum-graecum*).

Status and trends

In Ethiopia, major threats to horticultural plant species are drought, pests, disease, replacement by food grains and deforestation. Deforestation mainly affects wild coffee and spices. The gene pool of *Coffea arabica* is highly endangered by increasing settlement and land-use pressure on the montane rainforests. Enset is experiencing loss of its populations and diversity caused by family size increment and land shortage that forces the household to consume it at early stages (Abraham *et al.*, 2012). Imported varieties of horticultural crops are also posing threats to farmers' varieties. Local mango variety in Wellega, for example, has been replaced by a mango variety introduced from Pakistan, which is highly susceptible to white skin disease (Alemu *et al.*, 2024).

The Ethiopian Biodiversity Institute has established several field genebanks in agro-ecologically representative parts of the country to conserve and promote sustainable utilization of horticultural crops.

Currently, over 92,258 accessions of field crops, coffee, spices, and root and tuber crops are conserved in these field gene banks. Furthermore, the Kafa Coffee and Yayo Forest Coffee Biosphere Reserves have been designated due to their significance in the conservation of wild arabica coffee genetic resources (UNESCO, 2010).

2.2.2. Wild plant genetic resources

The majority of wild plant genetic resources grow in natural and semi-natural ecosystems. These plants are the sources of genetic resources used by people for various purposes, including medicinal, food and forage.

Forest genetic resources

The forest resource base of Ethiopia is estimated to cover about 23.6 % (Figure 7) of the country's landmass (EFD, 2024). Apart from the natural and planted forests, the forest genetic resources of the country include trees outside natural forests, which are mainly

found in traditional agro-forestry systems. The area coverage of trees and shrubs that are found on farm lands is not clearly known.

Although species richness varied across forests, forests including woodlands are home to the vast majority of plant species. They are also depositories and gene pools for several domesticated plants. They comprise diverse tree, shrub and herbaceous species. There are about 1000 woody trees and shrubs in the forest vegetation of the country.

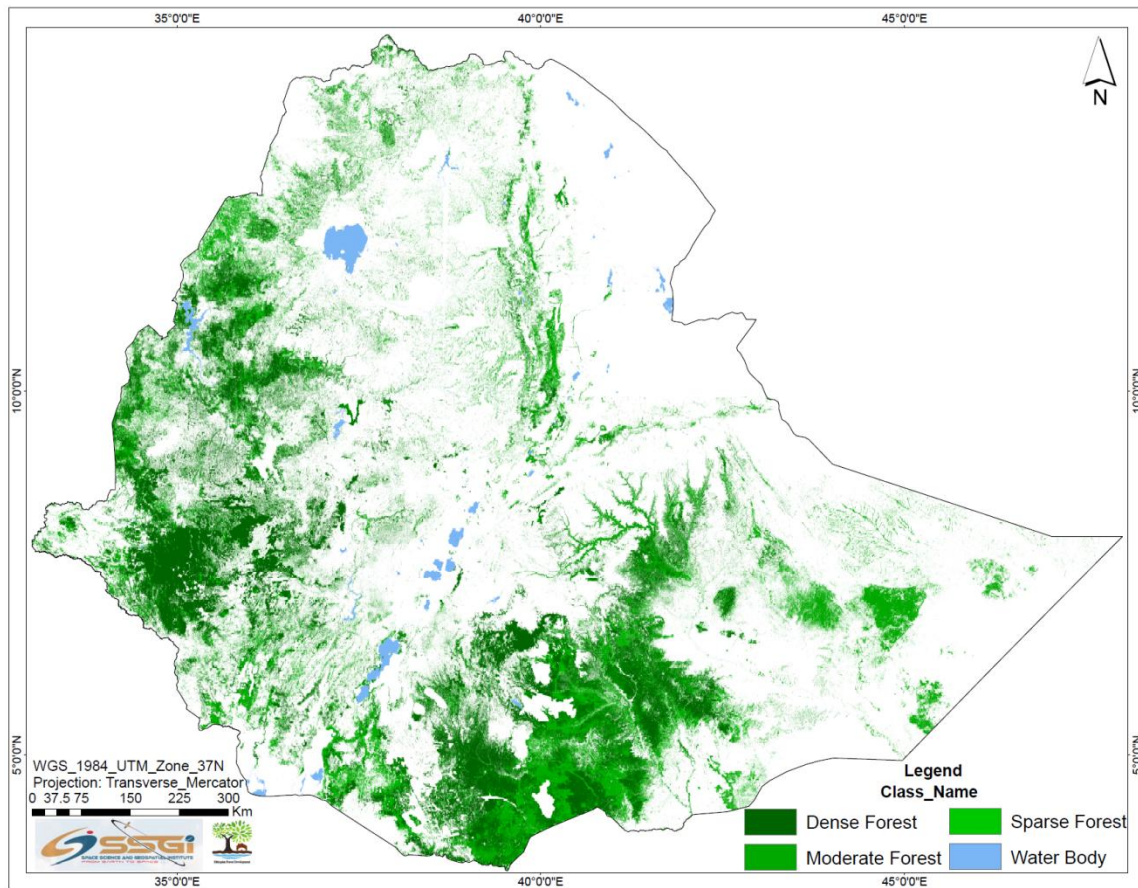


Figure 7: Forest land cover map of Ethiopia (Source: SSGI and EFD, 2022)

Status and trends

Despite their importance, forest resources of the country are seriously threatened by deforestation, agricultural expansion, invasive species, over-exploitation (illegal logging, firewood collection, overgrazing), settlement, climate change and forest fire.

As a result, several forest species are threatened. For example, *Boswellia papyrifera* and *Oxytenanthera abyssinica* (Yekola Qerkeha/Lowland Bamboo) are among the highly threatened species in the Benshangul Gumuz Region (MoFED, 2011; IBC, 2012a) due to conversion of forest land to other uses. So far, a total of 103 tree and shrub species are known as endangered species in the IUCN Red List (Annex I).

In order to reverse deforestation and forest degradation, and promote sustainable utilization of forest genetic resources, various efforts have been made by the government, NGOs and the private sector. These include *in situ* and *ex situ* conservation measures. The *in situ* includes establishment of new protected areas, including biosphere reserves and strengthening the existing ones, area closures and afforestation/reforestation. The *ex situ* conservation includes conservation in cold room, field gene banks and botanic gardens. Furthermore, various government initiatives such as the Green Legacy Initiative are among efforts that contributed to the conservation of forest genetic resources.

Medicinal plant genetic resources

The Ethiopian flora comprises a great variety of medicinal plants. The diverse medicinal plants are traditionally used by ethnic communities in different parts of the country. Endashaw (2007) reported that more than 70% of human and 90% of livestock populations depend on plant-based traditional medicine. According to Zemedu and Tigist (2007), the flora contains over 1000 medicinal plants, the vast majority of which are found in the wild. The diversity of medicinal plants used by local communities vary from place to place. From the total of 230 medicinal plant species identified from an assessment made in Mana Angetu 'woreda', Southeastern Ethiopia, for example, 78.70, 11.74 and 9.57% are used as human medicines, livestock medicines, and for treating both human and livestock ailments,

respectively (Ermias *et al.*, 2008). Similarly, 74 veterinary medicinal plant species that were distributed among 64 genera and 37 families were recorded in Bale Mountains National Park (BMNP) and adjacent areas (Haile *et al.*, 2007).

Status and trends

The country's wild flora, which is the repository of diverse medicinal plants, has come under intense human pressure. Therefore, most of the threats to wild flora are also threats to medicinal plants. These include deforestation, agricultural expansion, overharvesting, loss of forests and woodlands, fire and cultivation of marginal lands. Moreover, unsustainable utilization including uprooting are the major threats to medicinal plants in Ethiopia. Among the threatened species, *Echinops ellenbeckii* and *Taverneia abyssinica* are endangered and critically endangered, respectively. Similarly, species such as *Echinops kebericho* and *Securidaca longepedunculata* have highly declined and endangered due to over-exploitation and habitat destruction (Mander *et al.*, 2006). Conservation efforts have been made to conserve medicinal plant genetic resources by the government and the private sector. For example, medicinal plant germplasms have been collected and conserved under *ex situ* conditions in a cold store, 20 field genebanks and 3 botanic gardens by EBI.

Forage genetic resources

The flora of Ethiopia is rich in grass and legume forage species. There is a wide range of forage resources that are adapted to different ecosystems in the country. Ethiopia is known to be a centre of diversity for a number of important forage species in the genera *Trifolium*, *Vigna*, and *Dolichos*, which are herbaceous legumes, among others. Out of the 26 indigenous species of *Trifolium*, eight are endemic to Ethiopia. Major forage species of the country include *Stylosanthes fruticosa*, *Neonotonia wightii*, and species of *Alysicarpus*, *Indigofera*, *Tephrosia*, *Vachellia*, *Erythrina*, *Pennisetum*, *Rhynchosia*, *Trifolium*, *Medicago*, *Brachiaria*, and *Crotalaria*. There are 159 genera with 569 species of grasses, 108 genera with 358 species of legumes and 179 species of trees used by domestic animals.

Status and trends

Attributed to various factors, many palatable forage species are highly threatened (IBC, 2009). Overgrazing and/or browsing, drought, invasive species and conversion of grazing lands to crop lands are the main threats to forage species. Invasion by non-palatable indigenous species such as *V. mellifera*, *V. nubica*, and other invasive alien species such as *Prosopis juliflora* and *Parthenium hysterophorus* and overgrazing have resulted in the loss of high quality and palatable plants in the rangelands. According to data and information obtained from bureaus of agriculture of Afar region *P. juliflora* alone covers about 51,000 ha of rangelands of the region. Similarly, most of the grass and bush lands in the lowland areas of Oromia region are invaded by *P. juliflora*. In Amhara region, expansion of farmlands is reported to be a major threat to its rangelands and forage genetic resources.

Activities such as clearing invasive species, selecting and multiplying productive forage species adaptable to specific areas, testing indigenous tree species suitable for feed, banning open grazing, enclosing rangelands and *ex situ* conservation are undertaken to ease the pressure on rangelands and forage resources of the country.

Edible wild plant genetic resources

The flora of Ethiopia has diverse edible wild plant genetic resources which are found in different habitats. According to Ermias *et al.* (2011), a total of 413 edible wild plants found in Ethiopia are consumed by local communities in different parts of the country. Nevertheless, studies conducted on EWPs cover only about 5% of the country (Ermias Lulekal *et al.* (2011). These plants have supplementary, seasonal and emergency roles in the communities in Ethiopia. Some EWPs such as *Berchemia discolor*, *Carissa spinarum*, *Amaranthus graecizans*, *Amorphophallus gallaensis*, *Dovyalis abyssinica* and *Mimusops kummel* are also used as a source of income.

Status and trends

In Ethiopia, studies conducted on EWPs have limited coverage of about 5% of the country as indicated in various sources (Gunand and Dechassa, 2000; Ermias *et al.*, 2011;

Yohannes T., 2015). Edible wild plants are found in various habitats, most of which are under growing anthropogenic threats. The contribution of EWPs and associated community knowledge to food security is neglected. Factors that threaten forest resources are also the threats to EWPs and their natural ecosystems, resulting in a decrease in the diversity of EWPs from time to time.

The conservation of edible wild plants in the country is related to the conservation of natural habitats. As in the case of medicinal plants, area closures, watershed-based natural resources conservation (soil and water conservation, afforestation), participatory forest management and establishment of protected areas are among the efforts that could contribute to the conservation of natural habitats, which could be home to WEPs. Moreover, many edible wild plants are maintained in home gardens for various purposes.

2.3. Animal Genetic Resources

Animal genetic resources can be broadly grouped into three major categories. These are domestic/farm animal, wild animal and aquatic animal genetic resources.

2.3.1. Farm animal genetic resources

Ethiopia has served as a gateway to domestic animals from Asia to Africa and the country's diverse ecology favored the diversification of these resources. The country hosts the largest livestock population in Africa and ranks fifth globally, with over 71 million cattle, 43 million sheep, 54 million goats, 57 million poultry, 13.33 million equines, and 7 million bee colonies (Begna, 2023). The most common farm animals of the country are categorized into mammals, avian and honeybees. Cattle, sheep, goats, camels, donkeys, horses and mules are the major farm animals that lie under the mammalian category. Under the avian category are chicken, ostrich and turkey. However, the latter two avian species are not widely used in the country.

According to the third country report on the State of AnGR (EBI, 2025), the number of breeds registered are 27 cattle, 15 sheep, 11 goats, 17 chickens, 8 horses, 6 donkeys, 8

camels, 2 honey bee species, and 6 stingless bee species (Annex II). As a result of breed characterization and identification works being conducted in the country, the number of breeds of cattle, sheep, goats, camel, horse, and chicken shows some variations from former reports (IBC, 2004; 2012b; EBI, 2014). Although the majority of the Ethiopian livestock are indigenous breeds, some exotic cattle, sheep, goats and chicken breeds have been introduced by different institutions in the last five decades. Out of the exotics, Holstein-Friesians and Jersey cattle, and their crosses with different indigenous breeds are the majority for this group (IBC, 2012b). Crossbreeds used under medium input production system are those produced from crossings between exotic sires and five indigenous dam breeds, namely: Borena, Horro, Fogera, Arsi and Begait. Based on data obtained from Central Statistical Agency (2021), 97.4% of the Ethiopian cattle populations are local breeds while the remaining are hybrid and exotic.

Similarly, there are several exotic poultry breeds and their crosses introduced in to the country. The composition of indigenous, hybrids and pure exotic poultry in 2014 was 96.83%, 2.37% and 0.80%, respectively (CSA, 2014b). Thus, several-layer, broiler and dual-purpose exotic chicken breeds and hybrids are being used by small and large-scale commercial producers in urban and peri-urban areas. Some of their crosses with indigenous chicken are used by rural smallholders for egg and meat production. According to CSA (2021), indigenous chickens make up approximately 78.5% of the national poultry population, where hybrid chickens account for about 12.02% and exotic chickens comprise around 9.11% (Figure 8).

These show that there is a decrease in indigenous chicken (from 97% to 78.5%) which is due to expanded efforts in breed improvement and commercial poultry development. The tripling of hybrid and exotic shares suggests active extension programs and increased investment in modern poultry genetics, which implies the urgent need to conserve the declining indigenous genetic resources. Thus, EBI in collaboration with other stakeholders, has established more than 21 *in situ* breed conservation sites and 120,000 straws have been collected from the threatened breeds and conserved *ex situ*. Moreover, other institutions

such as International Center for Agricultural Research in the Dry Areas have established *in situ* breed conservation sites in various parts of Ethiopia.

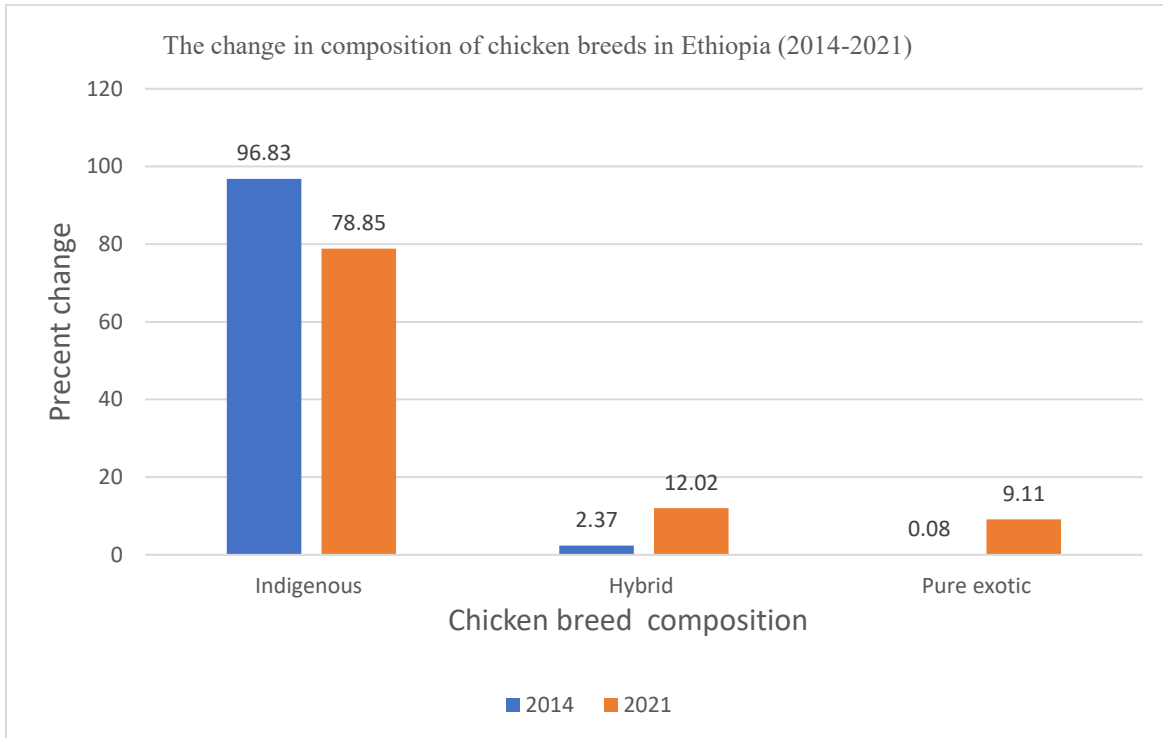


Figure 8: The change in composition of chicken breeds in Ethiopia (2014-2021)

Status and trends

Ethiopia, known for having the largest livestock population in Africa, also boasts remarkable diversity in its indigenous animal genetic resources. This diversity is shaped by the country's unique geography, cultural practices, and climatic variation. Despite significant phenotypic and genetic characterization studies that reveal extensive breed diversity, inconsistent methodologies and limited geographic coverage have led to confusion in breed identification and naming. These discrepancies have hindered effective conservation and genetic improvement efforts.

Ethiopia has officially recognized a total of 100 indigenous farm animal breeds and species. This updated and standardized classification is now registered in the national database and

incorporated into Ethiopia's third country report to the Food and Agriculture Organization of the United Nations.

2.3.2. Wild and aquatic animal genetic resources

Ethiopia encompasses a wide range of ecosystems with a great variety of habitats, contributing significantly to the country's high faunal diversity and endemism. Over the past three decades, research based on field surveys and the application of modern DNA and molecular analysis techniques has led to the discovery of numerous new taxa (at both generic and species levels), along with several taxonomic revisions (e.g., Mengistu, 2012; Lavrenchenko & Bekele, 2017; Bryja *et al.*, 2019; Konečný *et al.*, 2020; Tiutenko & Zinenko, 2021; Krasova *et al.*, 2022; Martynov *et al.*, 2023). The ongoing discovery of new species, particularly in remote and underexplored areas, clearly indicates that the current understanding of Ethiopia's fauna remains incomplete.

Recent taxonomic data indicate that Ethiopia hosts 323 mammal species of which 55 are endemic while 33 are threatened (EBI, 2024a). These are classified into 145 genera, 43 families, and 13 orders. Among these, 64 species (approximately 20%) are endemic to the country (Asefa *et al.*, 2025). Notably, six mammalian genera are endemic to Ethiopia: *Megadendromus*, *Muriculus*, *Nilopegamys*, *Theropithecus*, *Desmomys*, and *Stenocephalemys* (Asefa *et al.*, 2025). The high diversity and endemism of Ethiopia's mammalian fauna are largely attributed to the ecological and habitat diversity, as well as the isolation of the highlands by the Great Rift Valley (Yalden *et al.*, 1996). The Ethiopian highlands are especially rich in endemic species, with alpine moorlands and montane forests supporting 28 (48.3%) and 25 (43.1%) endemic species, respectively (Asefa *et al.*, 2025). The Rift Valley plays a significant role as a geographical barrier driving speciation: 38 (65.5%) of the country's endemic mammals are confined to either the south-eastern or western (north-western and south-western) highlands (Tessema *et al.*, 2022). These findings underscore the importance of the Ethiopian highlands in mammalian evolution and highlight the urgent need to prioritize conservation in these key regions.

Ethiopia is home to several charismatic and flagship mammal species, including the Gelada (an endemic genus and the world's only grazing primate), Mountain Nyala, Ethiopian Wolf, and Walia Ibex (the latter restricted to the Simien Mountains). Additionally, remnant populations of African Elephant (estimated at around 1,000, including 150 *Loxodonta africana orleansi*), Lion (estimated at 1,000), and various large ungulates persist. There are also isolated populations of Black Rhino, although it is widely believed that the species may now be extinct within Ethiopia (Asefa *et al.*, 2024).

Compared to other vertebrate groups, Ethiopia's birds are relatively well studied (Ash & Atkins, 2009). Currently, a total of 926 bird species, 24 endemic and 33 threatened species, are recorded (EBI, 2024a). This number accounts for more than 40% of Africa's total bird species, which belong to 353 genera, 93 families, and 27 orders (Asefa *et al.*, 2024a). There are four endemic bird genera: three with widespread distributions (*Cyanochen*, *Rougetius*, and *Parophasma*) and one (*Zavattariornis*) with a restricted distribution in southern Ethiopia (EWNHS, 2001). Of the total species, 546 (67%) are resident and 275 (33%) are migratory. In terms of habitat, 665 species (81%) are terrestrial birds, while 156 species (19%) are waterbirds.

Ethiopia's bird fauna includes 187 biome-restricted species (27.8% of the total): 56 Afrotropical, 97 Somali-Masai, 19 Sudan-Guinea, 9 Saharo-Sindian, and 6 Sahelian biome species (EWNHS, 2001; Ash & Atkins, 2009). Thirteen bird species are classified as range-restricted (occurring in areas smaller than 50,000 km²), and all, except *Streptopelia reichenowi* and *Ploceus dichrocephalus*, are endemic. These species are distributed across four Endemic Bird Areas (EBAs) (EWNHS, 2001):

1. Jubba and Shabelle Valleys EBA: *Streptopelia reichenowi*, *Mirafraga degodiensis*, *Ploceus dichrocephalus*
2. South Ethiopian Highlands EBA: *Tauraco ruspolii*, *Caprimulgus solala*, *Heteromirafraga sidamoensis*, *Hirundo megaensis*, *Zavattariornis stresemanni*

3. Central Ethiopian Highlands EBA: *Francolinus harwoodi*, *Myrmecocichla melaena*, *Serinus flavigula*, *Serinus ankoberensis*
4. Northern Ethiopia Secondary Area: *Cercomela dubia*.

To date, the Ethiopian Wildlife and Natural History Society (EWNHS) has identified 69 Important Bird Areas (IBAs), covering a total area of 47,757 km², equivalent to at least 4.3% of the country's land area (EWNHS, 2001). These IBAs are presented in Figure 9, with a full list provided in Annex III.

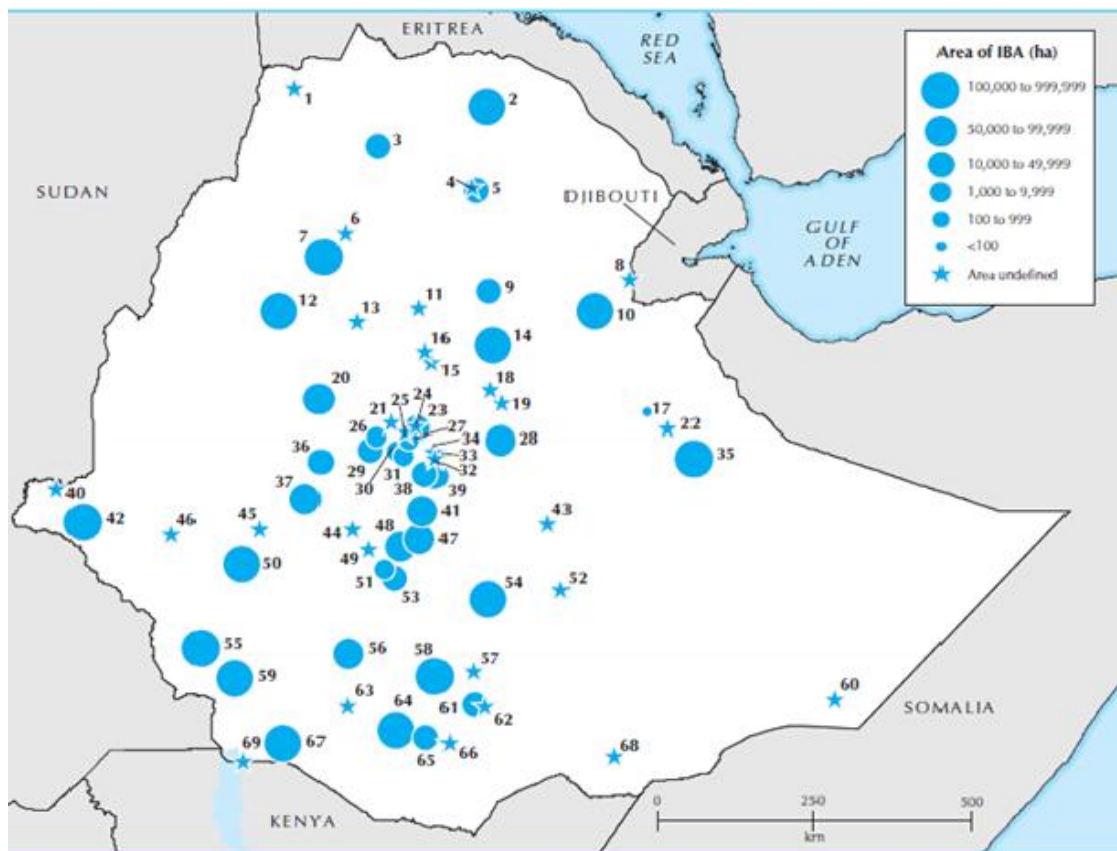


Figure 9: Important Bird Areas of Ethiopia (Birdlife International, 2001)

Insects dominate both aquatic and wetland, and other ecosystems and inhabit nearly all conceivable habitats. Currently, 4693 species of arthropods, of which 823 endemic species are registered to be found in Ethiopia (EBI, 2024a). However, the arthropod fauna of

Ethiopia including insects remains poorly studied and documented. Similarly, data on the country's amphibians are limited and fragmented. A study on amphibian species composition so far identified 81 species, including 30 endemic and 11 threatened species (EBI, 2024a). Similarly, 242 reptile species have been recorded, of which 19 species identified are endemic (Seyoum *et al.*, 2005; EBI, 2024).

Ethiopia is home to approximately 30 major lakes, 12 major river basins, and over 70 wetlands distributed across various regions of the country (Figure 10). To date, a total of 177 fish species, of which 40 are endemic and 11 threatened (EBI, 2024a), 91 benthic and aquatic insect species, and 141 zooplankton species have been identified from these aquatic and wetland ecosystems (Redeat, 2012).

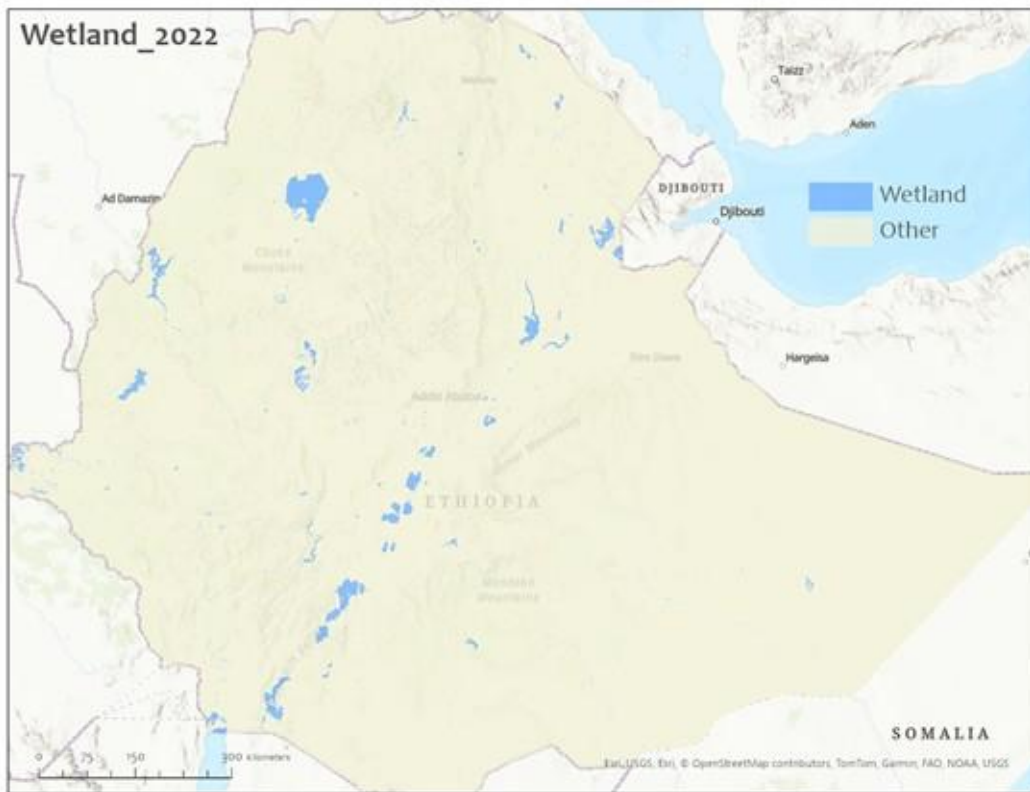


Figure 10: Distribution of the Ethiopian wetlands (Source: GSSI, 2022c)

Status and trends

Information on the status and trends of wild fauna in general is scarce. According to the IUCN Red List (2008) and EBI (2024), Ethiopia is home to 88 species of different threat levels, among these, five are critically endangered, 27 endangered, and 47 vulnerable species of wild animals. Among the country's 323 wild mammalian species, several require urgent conservation measures, including the Walia Ibex (*Capra walie*), Gelada Baboon (*Theropithecus gelada*), Mountain Nyala (*Tragelaphus buxtoni*), Ethiopian Wolf (*Canis simensis*), and Starck's Hare (*Lepus starcki*). Some of these species have very restricted ranges, most notably the Walia Ibex, considered one of the most endangered mammals globally (IBC, 2005, 2009). A comprehensive list of critically endangered (CR), endangered (EN), and vulnerable (VU) wild mammals found in Ethiopia, based on the 2004 IUCN Red List, is presented in Annexes IV and V.

Regarding avifauna, assessments indicate that 33 bird species in Ethiopia are under varying levels of threat. Of these, five species such as *Sarothrura ayresii*, *Tauraco ruspolii*, *Heteromirafra sidamoensis*, *Serinus flavigula*, and *Serinus ankoberensis* are critically endangered. Twelve species, including *Aythya nyroca*, *Aquila clanga*, *A. heliaca*, *Falco naumanni*, and *Francolinus harwoodi*, are classified as endangered. An additional 14 species, such as Prince Ruspoli's Turaco, Greater Spotted Eagle, Lesser Kestrel, Yellow-throated Serin, Nechisar Nightjar, and Wattled Crane, are considered vulnerable to extinction. Furthermore, numerous migratory birds listed as globally threatened visit over 50 sites in Ethiopia annually. Three of Africa's Endemic Bird Areas (EBAs) including the Jubba and Shabelle Valleys, the South Ethiopian Highlands, and the Central Ethiopian Highlands partially or wholly lie within Ethiopia (BirdLife International, 2001).

Aquatic and wetland fauna in Ethiopia face a range of serious threats, including habitat degradation, overharvesting, unsustainable water use, flow modification, siltation, mining, wetland drainage for alternative land uses, and pollution. These pressures have the potential to drive the extinction of fish and other aquatic species that are unable to tolerate such

disturbances (Abebe & Eshete, 2012). For example, fish diversity in Lake Abijata is under severe threat due to increased water extraction, siltation, and habitat alteration. Similarly, Lake Awassa is heavily polluted by municipal and hospital waste, placing its aquatic biodiversity at risk. As a result of these pressures, Tilapia populations in Lakes Awassa and Ziway, as well as Nile perch in Lake Chamo, are showing signs of overexploitation. Despite these growing threats, conservation efforts targeting the aquatic and wetland ecosystem remain very limited. According to IUCN (2008) and EBI (2024), the number of threatened species among Ethiopia's other faunal groups includes: one reptile, 11 amphibians, eleven fish, three mollusks, and 11 other invertebrates. In the Lake Tana sub-basin, the python has been identified as critically endangered, primarily due to habitat fragmentation, degradation, and human persecution. Three additional reptile species in the same region, such as the Nile Crocodile, Water Snake, and Nile Monitor, are classified as vulnerable (Seyoum *et al.*, 2005). Many herpetofauna are increasingly at risk due to widespread habitat destruction, raising the possibility of local or total extinction (Largen & Spawls, 2006).

To safeguard its wildlife genetic resources, Ethiopia has established various types of protected areas (PAs), including national and regional parks, sanctuaries, wildlife reserves, rescue centers, controlled hunting areas, botanical gardens, national forest priority areas, and biosphere reserves. In addition to formal designations, some lands are protected through community belief systems and by scientific research institutions focusing on forests and plant conservation.

Currently, protected areas cover approximately 12% of Ethiopia's land area. Several PAs, including Alatish, Omo, Maze, and Chebera Churchura, have been gazetted at the regional level (IUCN-BIODEV, 2022), while seven national parks have been designated at the federal level. In addition, the EBI in collaboration with other stakeholders, has established more than 33 ecosystem-based *in situ* conservation sites to ensure sustainable utilization of wild animal genetic resources and their ecosystems. However, not all of the country's key ecosystems are adequately represented within the existing PA networks. This lack of

ecological representation poses a major challenge to the conservation of Ethiopia's threatened, endemic, and unique species.

Moreover, even areas designated for wildlife conservation face significant pressures and limitations. These include inadequate institutional, legal, and financial capacity; rapid population growth; deforestation; invasion by alien species; open-access resource use; agricultural encroachment; and overgrazing by large livestock populations (USAID/Africa, 2008; EWCA, 2009). An overview of Ethiopia's protected area systems is presented in Table 2 and Figure 11.

Table 2: Ethiopian protected areas by category and management authorities

Designation name	Managing Authority	No. of PAs	Total area (km ²)
National Park	EWCA	11	21,830
	Regional States	18	21058
Sanctuary	EWCA	2	8,832
	Regional States	2	660
Wildlife Reserve	Regional States	3	20,596
Community-Conservation Areas	Regional States	6	2,399.5
Controlled Hunting Area	EWCA, Regional States and concessionaires	38	39,767.5
Open Hunting Area	EWCA, Regional States and concessionaires	5	465
UNESCO MABS	EBI	5	20,606
UNESCO Natural WHS	EWCA (2)	-	-
Protected Forest	Regional States	48	31,534
Total		138	167,748

Source. EWCA *et al.* (2025)

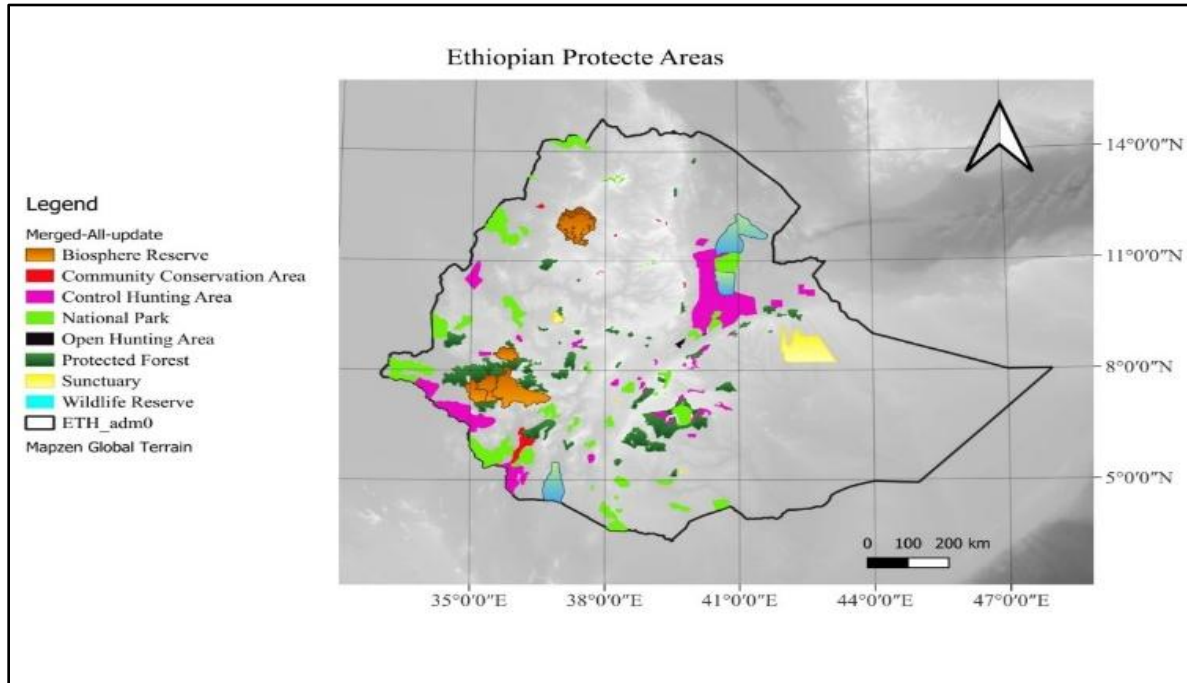


Figure 11: Protected Areas of Ethiopia (EWCA et al., 2025)

2.4. Microbial Genetic Resources

Ethiopia's microbial genetic resource is part of the multifaceted interactions among the macro-organismal diversity (flora and fauna), socio-cultural practices, and other abiotic environments, all of which enhance and sustain its remarkable richness. The physiographic, geological and climatic factors that generated Ethiopia's floral and faunal diversity and their diversified ecosystems have also shaped its microbial diversity through environmental filtering and niche partitioning (Fierer *et al.*, 2011; Ayalew *et al.*, 2022). Beyond natural drivers, Ethiopia's socio-cultural practices including diverse agricultural practices (e.g., enset-based agroforestry, scattered tree agroforestry, pulse-cereal crop rotation, and alley cropping as well as locality-specific agronomic practices), pastoralist land use practices, traditional fermentation of food, beverages and condiments (*injera*, *tella*, *tej*, *borde*, *shameta*) created human-engineered microbial niches hosting characteristic species and strains (Gebremariam *et al.*, 2014).

Ethiopia's extreme altitudinal gradients, ranging from the hyper-arid Danakil Depression (126 meters below sea level) to the Afroalpine Semien mountains 4,620 meters a.s.l. creates a spectrum of thermal and moisture regimes that select for specialized microbial communities. Oligotrophic-adapted and xerotolerant microbial communities dominate the arid lowlands, mesophilic communities thrive under balanced moisture in mid altitude, the psychrotolerant and acidophilic assemblages adapted acidic soils (Ayalew *et al.*, 2020; Mengistu *et al.*, 2021), the volcano-derived Andosols rich in phosphorus, host phosphate-solubilizing *pseudomonas* and mycorrhial *Glomeromycota*, whereas waterlogged Vertisols support methanogenic *Methanobacteriaceae* (Kebede *et al.*, 2023; Tadesse *et al.*, 2022). Alkaline lakes (e.g., Lake Shala) and geothermal sites add another layer, favoring alkaliphilic *Cyanobacteria* and chemoautotrophic *Nitrosomonas* (Cavicchioli *et al.*, 2019).

Legume diversity in Ethiopia is associated with diverse assemblages of nitrogen-fixing rhizobia, with recent studies revealing unprecedented strain level specificity tied to host crop genotypes, agroecologies and micro-climates (Asfaw *et al.*, 2023; Degefu *et al.*, 2023). This remarkably diverse rhizobia extends beyond classical *Rhizobium* species to include novel *Mesorhizobium*, *Bradyrhizobium*, and *Pararhizobium* strains that have co-evolved with Ethiopia's legume varieties across diverse agroecological zones (Tena *et al.*, 2022; Kebede *et al.*, 2023). For example, *Rhizobium leguminosarum* symbiovar *viciae*, is the dominant rhizobia associated with faba bean in the major growing areas of the country. Microbes also have a symbiotic relationship with animal species through diet and habitat modification. For example, the Ethiopian wolf's gut microbiome shifts to altitudinal-adapted *Firmicute* (75% at 4,000 meters below sea level), reflecting specialized physiology (Erens *et al.*, 2023), while gelada monkeys (*Theropithecus gelada*) enrich soil with graminoid-digesting *Prevotella* (20% of soil 16S reads) via fecal deposition (Schielzoh *et al.*, 2022). Termite mounds (*Macrotermes*) in Gambela enhanced lignocellulose degrading *Fibrobacteres* (50% of the mound communities), and hippopotamus wallow in the Baro river basin create anaerobic zones dominated by sulfate-reducing *Desulfovibrio* (90% of archaeal sequences) (Assefa *et al.*, 2023; Getahun *et al.*, 2023).

Ethiopian fermented foods are global hotspots of microbial diversity, with each practice favoring distinct taxa. *Injera* fermentation relies on autochthonous *Lactobacillus injensis* (98% sequence similarity to wild 'tef' rhizosphere strains) and *Saccharomyce cerevisiae* var. *ethiopicus* (absent in commercial yeasts (Gebremariam *et al.*, 2023). Metagenomics of *tella* identifies clay-pot-aged *Pichia membranifaciens* as the dominant yeast (90% of ITS sequence similarity), alongside rare *Bacillus spp.* contributing sourness (Schoustra *et al.*, 2023). Pastoralist 'ergo' (spontaneous fermented milk) showcases acid-tolerant *Lactobacillus kefiranofaciens*, with strain diversity directly correlating with cattle breed diets (*Bos indicus* vs. *B. taurus*) (Duguma *et al.*, 2024). According to Adugna *et al.* (2024), lowland *tej* (honey wine) microbiome diverges sharply from highland versions, with *Zymomonas mobilis* uniquely dominating (<5% in highlands).

Despite limited studies, a remarkable diversity of edible wild mushroom species is documented in forests and other areas such as grazing lands and agricultural areas. For example, Kewessa *et al.* (2022) documented 64 edible species from 31 genera and 21 families, while Sitotaw *et al.* (2017) reported 105 species across 23 families and 49 genera, many of which are new records for Ethiopia. Beyond forests, species such as *Agaricus campestris* and *Coprinus comatus* flourish in pastures and farmlands, demonstrating the adaptability of wild fungi to anthropogenic landscapes (Alemu, 2013; Abate, 2014). While saprophytic species dominate, termitophilic genera like *Termitomyces* also contribute to this diversity, particularly in savanna and agroforestry systems. Ectomycorrhizal (ECM) fungi like *Lactarius* and *Amanita* are also reported (Brundrett, 2009; Decock *et al.*, 2005). The widespread occurrence of edible mushrooms across diverse land uses, coupled with unidentified taxa, highlights Ethiopia's untapped mycological potential.

Status and trends

Despite their immense values, microbial genetic resources; remain poorly characterized and valued. The unique and rich microbial genetic resources of Ethiopia is facing mounting threats from land-use changes, deforestation, declining of natural ecosystems and populations of crop wild relatives, climate change, soil erosion, invasive species, change

of certain farming practices that enhance microbial diversity and environmental pollution. Despite these pressures, research institutions like the Ethiopian Institute of Agricultural Research (EIAR), universities, and the Ethiopian Biodiversity Institute (EBI) are actively cataloging, conserving and promoting sustainable utilization of these resources for agriculture, industry, and environmental applications. To date, EBI has characterized and conserved 1,350 microbial species/strains with documented economic potential.

2.5. Cultural Diversity

Ethiopia is a culturally diverse nation, home to over 80 ethnic groups with distinct languages and dialects. This cultural diversity is closely linked to a wide array of indigenous knowledge, practices and innovations, particularly associated with the conservation and sustainable use of biodiversity.

In rural areas, farming and pastoralist communities have maintained a wide range of crops, livestock, and associated biodiversity. The community knowledge and traditional practices have also been widely used in traditional healthcare using plants and animals among others. Several studies have been conducted to document community knowledge associated with medicinal and edible wild plants, as well as natural resource management. For example, community knowledge associated with over 1000 medicinal plants has been documented (Zemedu and Tigist, 2007). Similarly, community knowledge associated with about 413 edible wild plants has been documented by different authors (Ermias *et al.*, 2011).

Status and trends

Despite their roles, community knowledge associated with biodiversity is declining. Many factors have contributed to the erosion or loss of knowledge including cultural homogenization and desire for modernization, disappearance of traditional practices and uses associated with biodiversity, increasing reliance on modern healthcare, loss of plant and animal species, displacement, and weak integration with modern scientific practices (Mrutse, *et al.*, 2009). In order to make use of this knowledge, the government has recognized the contribution of community knowledge associated with biodiversity/genetic

resources in its Access to Genetic Resources and Community Knowledge, and Community Rights Proclamation No. 482/2006. It also recognized the right to share benefits from the use of indigenous knowledge associated with biodiversity.

Table 3: Summary of achievements in biodiversity conservation and sustainable use

Items	Unit	Quantity
Restoration	ha	<ul style="list-style-type: none"> 48 billion seedlings planted by the Green Legacy Initiative
<i>In situ</i> conservation	%	<ul style="list-style-type: none"> 0.08% of the total land mass covered by species and ecosystem-based conservation for forest and wild animal genetic resources 12% of the total land mass covered by PA and biosphere reserves
	No	<ul style="list-style-type: none"> 178 on-farm <i>in situ</i> conservation site cooperatives established for the conservation of crop varieties and animal breeds
<i>Ex situ</i> conservation	No	<ul style="list-style-type: none"> 92,258 crop and horticulture, 3,644 forest and rangeland plant accessions, 120,000 straws of semen, 1,350 microbial species/strains conserved
	%	<ul style="list-style-type: none"> 23.6% of the country's land mass under forest cover 30% of biodiversity hot-spot areas under spatial plan
Sustainable utilization and Access and benefit sharing (ABS)	No.	<ul style="list-style-type: none"> 269,727 cereal and horticultural crops accessions 5,200 forest and rangeland plant accessions, 9,000 straws of semen, 506 microbial species/strains released/distributed for research and restoration purposes 1,500 ABS related agreements granted on genetic resources
Preserved in herbarium and museum		<ul style="list-style-type: none"> 7,000 plant specimens, and 4500 animal specimens

Table 4: Summary of the status of degradation, pollution and IAS distribution

Items	Unit	Quantity
Wetland degradation	km ²	27,142.5
Terrestrial land degradation	km ²	85, 24.3
Land degradation by grazing	%	43.7
Invasive alien species cover	Ha	3,949,314
Pollution by urban, industrial and agricultural sectors	tons	10, 000,000
Land-based greenhouse gas emissions	MtCO ₂ e	346

CHAPTER THREE

3. VALUES OF BIODIVERSITY AND ECOSYSTEM SERVICES

The various benefits provided by ecosystems are described as ecosystem services, which are essential to human wellbeing. The range of services provided by ecosystems are categorized into four, namely: provisioning, supporting, regulating, and cultural services.

Food, fresh water, fuel wood, fiber, bio-chemicals, and genetic resources are provisioning services. Besides provisioning services ecosystems also support soil formation, nutrient cycling, primary production. They also provide regulating services like climate regulation, disease regulation, water regulation, purification and pollination. Moreover, they provide cultural services including spiritual, religious, recreation, eco-tourism, esthetic, inspirational, educational, and cultural heritage services that are vital to human welfare and economic prosperity. However, data and information on the monetary values of biodiversity and ecosystem services in Ethiopia are scanty. Thus, based on limited available data, the values of ecosystem services are described as follows.

3.1. Values of Agricultural Diversity

Agriculture is the backbone of the national economy, contributing around 40% to the GDP and accounting for 80% of exports. The value of agrobiodiversity is described as crop and animal genetic resources.

3.1.1. Crop genetic resources

Crops play a vital role in agricultural production, driving economic growth and ensuring food security. In Ethiopia, five major cereal crops, tef, wheat, maize, sorghum, and barley, occupy approximately three-quarters of the total cultivated land. These cereals contribute around 39% to the agricultural GDP, 13.5% to the total GDP, and supply about 61% of the country's caloric intake (Asfaw *et al.*, 2024). With strong government commitment to food self-sufficiency, irrigated wheat production has emerged as a central pillar of Ethiopia's agricultural strategy to ensure full domestic supply, and generating surpluses for export (Effa *et al.*, 2023).

Pulse crops such as beans, peas, and chickpeas cover about 12% of Ethiopia’s grain cultivation area and account for roughly 10-15 % of national grain production (USDA, 2018). They are high-value crops for smallholder farmers and serve as an important source of nutrition, providing approximately 15% of the population’s dietary protein (Getachew, 2019). Pulse exports reached \$324.5 million in 2022/23, capturing 9.0% of total exports. This represented a significant increase of \$105.6 million (48.2%) from the previous year (Table 5). Additionally, pulses generated \$137 million in foreign exchange for the national economy in 2022 (ITA, 2024).

Coffee is another cornerstone of Ethiopia’s agricultural sector. It accounts for approximately 30–35% of Ethiopia’s total export earnings and annual coffee export volume is growing over the past five years (Table 6). In the 2024/25 season, output reached 468,966.59 metric tons marking a 0.36% increase from the previous year (CTA, 2025). For the 2025/26 marketing year, production is projected to reach 600,000 metric ton supported by favorable weather conditions, rejuvenated coffee trees, and improved input use. Export revenue is forecasted to grow to \$3 billion, driven by strong international prices and policy reforms that enhance market access.

Table 5: Export performance of crop genetic resources (million USD)

Export Commodities	Fiscal Years				
	2020/21	2021/22	2022/23	2023/24	2024/25
Coffee	1430.7	1340.2	1430.8	1212.5	2254.7
Oil seeds	265.7	258.0	333.2	312.9	313.5
Pulses	218.9	324.5	343.8	310.0	262.5
Fruits and Vegetables	87.8	92.5	65.1	61.8	69.5
Flower	541.6	567.8	469.9	432.8	444.9
Chat	391.6	247.5	164.5	155.9	111.1
Spices	16.8	10.5	8	7	13.8
Cereals and flour	33.6	32.5	20.9	19.8	29
Wheat	0	31.2	33.8	-	-
Natural Gum	2.2	1	2.5	2.4	2.3
Total	2988.9	2905.7	2872.5	2515.1	3501.3

Source: Ministry of Planning and Development (2025)

Table 6: Ethiopian coffee export and revenue (2021- 2025)

Year	Quantity (ton)	Revenue (in million)
2021	248,311.65	907.04
2022	302,762.34	1,424.58
2023	237,485.74	1,313.78
2024	298,488.31	1,426.83
2025	468,966.59	2,653.50

Source: Coffee and Tea Authority (2025)

Although the importance of genetic diversity is widely acknowledged, only a limited number of these resources have been assigned monetary values. Given the anticipated high costs of adaptation, the role of genetic diversity in enhancing the resilience of the agricultural sector to changing environmental conditions could be profoundly significant (MoFED, 2011).

Wild coffee genetic resources from Ethiopia have made notable contributions to the global coffee industry. A recent valuation study (Gole and Seyoum, 2024) estimates that leveraging the genetic diversity of wild Ethiopian Arabica coffee could boost domestic coffee production by USD 2.37–5.84 billion annually, while generating an additional USD 7.6–8.1 billion per year globally through trait enhancements such as improved disease tolerance, yield, and quality. Over the next 30 years, the cumulative global value of these contributions could reach as high as USD 1.45 billion (Hein and Gatzweiler, 2006; Gatzweiler *et al.*, 2007).

Despite Ethiopia's position as one of the world's leading oilseed exporters and its reliance on this sector for vital foreign exchange, recent years have seen a marked decline in export volumes. Between 2017/18 and 2021/22, oilseed exports fell by an average of 14.6% annually (Balami *et al.*, 2023). According to the USDA (2021), this decline is attributed to a range of challenges, including volatile international prices and exchange rates, speculative trading, domestic price distortions, illicit trade, and decreasing productivity. In

2022/23, Oilseeds exports were valued at \$258.0 million, representing 7.1% of total exports. This reflected a decrease of \$7.9 million (3.0%) from the previous year, although its share of total exports slightly rebounded (Table 5). In addition, Ethiopia is among the leading producers of natural gums. For instance, in 2009/10, the country earned USD 12.68 million from the export of gums and incense (MoFED, 2010).

3.1.2. Farm animal genetic resources

Livestock play a crucial role in Ethiopia's agricultural system and broader economy. They provide food, household income, draught power, farmyard manure, and fuel, while also fulfilling important ecological and social functions. Livestock contribute significantly to foreign exchange earnings through the export of live animals, meat and meat products, hides and skins, honey, and beeswax. Ethiopia produces over 3.8 billion liters of milk annually, valued at USD 5.1 billion, one million tons of beef worth USD 2.5 billion, and 116 million eggs. Livestock-derived foods, including meat, milk, eggs, and honey, are essential for nutrition and contribute to an estimated 20% increase in household caloric intake (Begna, 2023). According to the FAO (2019), the sector contributed up to 40 percent of agricultural GDP, nearly 20% of total GDP, and 20% of national foreign exchange earnings.

Honey production is another significant component of the livestock sector. Ethiopia's annual honey output is estimated at 43,373 metric tons, accounting for approximately 23.5% of Africa's total production and 2.35% of global honey production (Sahle *et al.*, 2018). Most honey is produced using traditional beehives, which represent about 97% of all beehives in the country (Drost & Van Wijk, 2011). Beekeepers typically consume 10% of their honey and sell the remaining 90%, primarily for income. A significant portion of this honey is used in the production of *tej*, a traditional honey wine. Traditional beehives yield 5–8 kg of honey per colony per year, while modern hives (e.g., top-bar or frame hives) can yield up to 20–30 kg annually (GBN Programme, 2020).

Ethiopia also has considerable fishery potential and current fish production is estimated at approximately 94,541 tons annually, with projected demand rising to 117,586 tons by 2025 (Wubie *et al.*, 2023). Due to Bounty of the Basket (*ye limat tirufat*) Initiative, production of milk (billion liters), eggs (billion numbers), chicken meat (thousand tons), honey (thousand tons) and fish (thousand tons) has leapfrogged to 13.1, 9.3, 190, 326.5 and 243.8, respectively (MoA, 2025). In addition, crocodile farming contributes to Ethiopia’s economic development. High crocodile populations exist in protected areas, including the Arba Minch Crocodile Ranch, which generates about USD 1.6 million annually (Seyoum *et al.*, 2005). According to the ranch manager, Dr. Tigist Ashagre (personal communication), the farm is now preparing to export safe, high-quality crocodile meat to international markets, where demand is strong and prices reach USD 260 per kilogram.

Insects provide further ecological and economic value. They serve as primary pollinators and occupy intermediate positions in the food chain across many communities, making them essential to ecosystem functioning and agricultural productivity (IBC, 2005). As indicated in Table 7, the total export value for the fiscal year 2022–2023 was USD 3,618.5, with contributions from various sectors varying. Leather and leather products, meat & meat products, and live animals have made up 0.7, 2.3, and 0.5% respectively of the total export share. Meat and meat products made up 81.7 percent, or 2.3%, of all exports.

Table 7: Export performance of farm animal genetic resources (millions USD)

Export Commodities	Fiscal Years				
	2020/21	2021/22	2022/23	2023/24	2024/25
Leather and Leather Products	33.2	24.7	19.9	18.7	16
Meat and Meat Products	109.6	81.7	70.4	63.2	101.7
Live Animals	29.2	17.5	43.5	39.0	106.3
Bees wax	1.2	1.1	1.4	1.1	0.8
Total Export	173.2	125.0	135.2	122.0	224.8

Source: Ministry of Planning and Development (2025)

3.2. Forest and its Ecosystem Services

Forests are critical habitats for biodiversity and provide a wide range of ecosystem services essential to human well-being (Brockerhoff *et al.*, 2017). In Ethiopia, forest resources contribute significantly to the country's economic, ecological, and social well-being at both national and local levels. Forest biodiversity plays a vital and multifaceted role in ensuring food security and supporting sustainable livelihoods for millions of households across the country. Forests contribute approximately 12.86% of Ethiopia's Gross Domestic Product (GDP). However, this figure does not fully capture the non-market benefits associated with forest conservation, such as carbon sequestration, watershed protection, and cultural values (UNEP, 2016).

Table 8: Contribution of major non-timber forest products to the National income

Types of non-timber forest products	Contribution in USD (Million)	Share (%) of the contribution
Wood fuel	5,858	4.52
Roundwood	1,904	1.47
Bamboo	26	0.02
Fodder	4,482	3.46
Coffee	1,808	1.39
Honey	210	0.16
Beeswax	29	0.02
Medicinal plants	184	0.14
Gums and resins	26	0.02
Spices	46	0.04
Thatch	106	0.08
Wild meat	69	0.05
Wild edible plants	39	0.03
Civet musk	-	<0.01
Silkworm cocoons	-	<0.01

Source: UNEP (2016)

Recent estimates indicate that 35–50% of Ethiopia's total coffee production comes from wild and semi-managed coffee forests (Amamo, 2014). The annual value of wild coffee alone is estimated at USD 1.43 billion (Ethiopian Coffee and Tea Authority, 2023). Furthermore, Ethiopia is rich in non-timber forest products (NTFPs), which include wild coffee, bamboo, gums, resins, wild fruits, honey, spices, medicinal plants, and fodder (Table 8). These products play a crucial role in supporting rural livelihoods and the national economy (Melese, 2016).

3.3. Wildlife and Ecosystem Services in Protected Areas

The protected areas are comprised of National Parks, Sanctuaries, Wildlife Reserves, Community-Conservation Areas, Controlled Hunting Areas, Open Hunting Areas, UNESCO MABs, UNESCO Natural WHS and Protected Forests. They cover about 12% of the country's land mass, and play critical roles in delivering essential ecological functions. These include watershed protection, soil stabilization and erosion control, the provision and filtration of clean water, climate regulation, and carbon sequestration. Such services contribute indirectly to the national economy by supporting agriculture, public health, and disaster risk reduction (Table 9).

The annual economic value of protected areas, managed under the Ethiopian Wildlife Conservation Authority for biodiversity, watershed management and carbon sequestration was estimated at about 519, 2002 and 4346 USD, respectively (EWCA, 2009).

Table 9: Ecosystem services value coefficients (US\$ ha-1 Yr-1) for forest

Ecosystem Services	Examples of Ecosystem Services	Plantation and Natural Forests
Provisioning	Water supply	9.52
	Food production	38.08
	Raw material	60.97
	Genetic resources	48.79
Regulating	Water regulation	7.14
	Waste treatment	161.84
	Erosion control	291.55
	Climate regulation	265.37
	Gas regulation	16.29
	Disturbance regulation	5.95
	Supportive service	Nutrient recycling
	Pollination	8.65
	Soil formation	11.9
	Habitat/Refuge	20.59
Cultural and recreation	Culture	2.76
	Recreation	5.71
Total		1,174.55

Source: Dubie and Anteneh (2022)

3.4. Microbial Genetic Resources

Ethiopia's rich microbial biodiversity is a vital yet underutilized asset, delivering crucial ecological, agricultural, industrial, environmental and medicinal benefits. Traditional farming systems enhance microbial diversity through targeted niche diversification. Highland crop rotation of cereal with pulse (e.g., *Eragrostis tef* with *Vicia faba*) enriches soil with nitrogen-fixing rhizobia (15% higher abundance versus monocultures) and phosphate-solubilizing *Pseudomonas* (*P. fluorescens* strains unique to Ethiopian soils) (Tamiru *et al.*, 2023). These microorganisms form the backbone of healthy ecosystems (e.g., diverse phytoplankton functional groups (FGs) maintain water quality (Etisa *et al.*, 2024)), driving nutrient cycling, enhancing soil fertility, and empowering plant resilience through symbiotic partnerships.

In agriculture, they serve as natural bio-fertilizers and bio-pesticides reducing dependency on synthetic input while boosting yields. For instance, field experiment conducted using three potential Plant Growth Promoting Rhizosphere microbial strains (*Pseudomonas fluorescens* biotype G, *Enterobacter cloacae* ss *disolvens*, and *Serratia marcescens* ss *marcescen*) have shown a significant yield increment of *tef* grain yield and yield-related agronomic traits (Tsegaye *et al.*, 2021). Few other studies have quantified nitrogen fixation of pulse crops in Ethiopia. For example, research by Degefu *et al.* (2023) demonstrate that faba bean (*Vicia faba*) fixes 120-180 kg N/ha/yr, which is equivalent to 80-120 USD/ha/yr in urea, which otherwise would have been expended for inorganic fertilizers. Similarly, Woldemeskel *et al.* (2023) estimated that common bean (*Phaseolus vulgaris*) contributes 60-100 kg N/ha/yr, valued at 39-65 USD/ha/yr. In general, current estimate show that Ethiopia's pulse crops fix 210,000-340,000 tons N/yr, worth \$151-244 million annually in urea savings.

Industrially, microbes play vital roles in biotechnology, generating enzymes, biofuels and value-added products. Microbes equally play medical and environmental roles through degrading pollutants recycling waste, and regulating climate through carbon and nitrogen cycles. Recent study conducted on microbial roles in industrial waste degradation showed that *Pencillium citrinum* Thom BCA & *Penicillium heriquei* decolorize turquoise blue dye up to 300 ppm with 90% removal at pH 4 and 87% at pH 7 up to 400 ppm, respectively (Gizaw *et al.*, 2024). Furthermore, their role in fermentations and brewing is pivotal. For instance, the Central Statistical Agency (2022) reported \$0.9-1.32 billion (18-22% of national food sector GDP), Gebremariam *et al.* (2022) estimated \$0.85-1.2 billion through direct market assessment, FAO (2021) calculated \$1.05-1.2 billion as Ethiopia's share of the regional fermentation market, and Merga & Beyene (2023) focused specifically on injera, ergo and tella/tej subsectors at \$0.95-1.05 billion. This comprehensive analysis yielded a consensus market value of \$1.0 ± 0.15 billion annually (mean ± standard deviation). However, none of the above reports have quantified contribution of fermenting microorganisms in the generation of this monetary value.

In addition to traditional fermented foods, the contribution of microbial biodiversity in industry-based fermentation processes is paramount. Microbial communities, particularly, yeasts (*Saccharomyces cerevisiae* and wild strains) and lactic acid bacteria (LAB), are playing a fundamental role in Ethiopia's beer and wine industries by driving fermentation, flavor development, and product diversification. Despite their significant importance, no comprehensive valuation of microbial contributions to these sectors exists in Ethiopia. However, studies indicated that Ethiopia's formal beer market was valued at \$1.2 billion in 2023 (Euromonitor International, 2023), while local wine production was estimated at \$50 million annually (Ethiopian Investment Commission, 2023). The contribution of yeast in the production of these two drinks is estimated to account for 15-20% production costs (Briggs *et al.*, 2024) and 5-10 for lactic acid bacteria in sour-style beers enhanced shelf life and acidity (Bokulich *et al.*, 2012). Using an average of 24.5% microbial contribution, industrial produced beer and wine had a total market value of 1.25 billion USD in 2023. Fermenting microbes (yeasts and LAB) contributed a total of \$317.5 million.

3.5. Values of Cultural Diversity/Indigenous Knowledge

The cultural diversity comprises diverse customary laws and practices that have contributed significantly to the conservation and sustainable management of the country's natural resources. Cultural diversity and associated indigenous knowledge play invaluable roles in a variety of fields including agriculture, health care services, weather or climate services and natural resource/biodiversity conservation. For example, *Kalo* rangeland and resource management among the Oromo, particularly the Borena while it is a system of traditional pasture land protection in Gamo culture; the *Gereb* herding and grazing agreements between Afar pastoralists and Tigrayan farmers; the *Qero* grassland management system used by the Menz people in the Amhara region; the Konso cultural landscape management system; and the *Kobo* system of forest stewardship in Sheka, Kafa, and other parts of southern and southwestern Ethiopia are among the cultural practices employed for natural resource management.

CHAPTER FOUR

4. CAUSES AND CONSEQUENCES OF BIODIVERSITY LOSS

Biodiversity and ecosystem services in Ethiopia are shaped by a range of interconnected direct and indirect drivers. Direct drivers include habitat alteration through land-use and land-cover changes, overexploitation of natural resources, the spread of invasive species, the replacement of farmers' crop varieties and local livestock breeds, climate change, and environmental pollution. Indirect drivers include factors such as demographic change, widespread poverty, limited public awareness, poor coordination among stakeholders and weaknesses in economic policies and institutional systems.

4.1. Direct Causes and Consequences

4.1.1. Habitat conversion

Conversion of natural forests, grazing lands, woodlands, and wetlands into agricultural land, settlement/urbanization, and land-use/land cover change are some of the threats to the biodiversity of Ethiopia. In some areas, land use change resulted in the loss of nearly all species of faunal and floral diversity led to increasing fragmentation of the remaining ecosystems (EBI, 2022).

Like the other parts of the world, the pace of urbanization is accelerating in Ethiopia. According to ESS (2025), 26.9% (32.9 million) of the country's population will live in urban settings by 2030. Job creation in the urban areas can reduce reliance on rural natural resources, easing environmental pressures in those areas (Sakkata, 2023). Urbanization affects biodiversity and ecosystem services in two ways: Direct impacts: habitat destruction and degradation, changes in land cover, and other physical alterations due to urban expansion. Indirect effects: shifts in water and nutrient cycles, elevated water and air pollution, and heightened competition from non-native species (Gunerapl *et al.*, 2013).

The greatest driver of declines in biodiversity is land-use/land cover change (Figure 12), affecting biodiversity, the functioning of ecosystems and the services they provide. The

major form of global land-use/land cover change is agricultural expansion for cropping, plantations and animal rearing, which impacts biodiversity and ecosystem services negatively. Expansion of agricultural land from 29.33% in the years 2004-2021 to 34.35% includes arable land, permanent crops, commercial farms and permanent pastures (Global Economy, 2022). This resulted in a decrease in wetland areas and grazing lands, but an increase in the settlement. On the other hand, forest cover has increased to 23.6% (EFD, 2024) in the past decade, attributed to different initiatives such as the Green Legacy Initiative. Similarly, Lake Haromaya that had dried-up by overutilization has been reviving, attributed to the above factors.

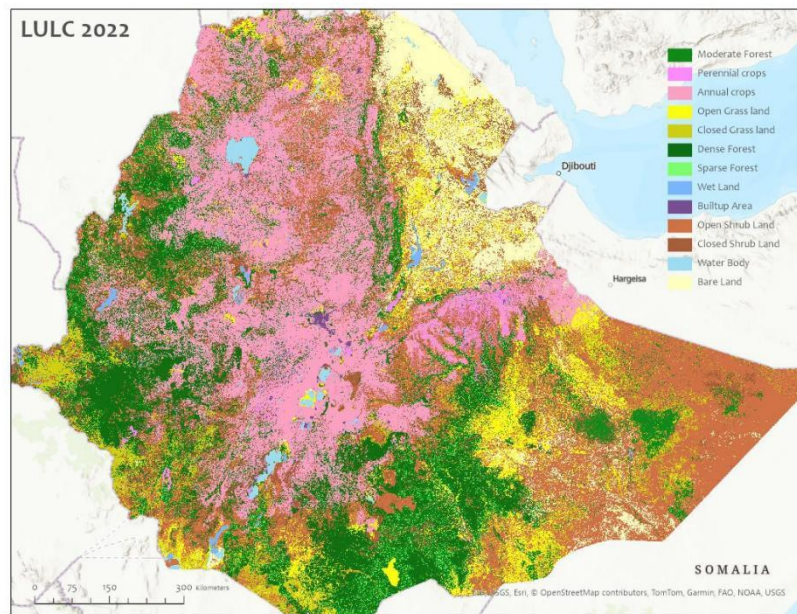


Figure 12: Land use land cover map of Ethiopia (Source: SSGI, 2022)

Attributed to high population growth, demand for arable land by small-scale farmers has also increased over time. As a result, the gene pool of *Coffea arabica* is, for example, highly endangered by increasing human encroachment and land-use change. Furthermore, the ever-increasing human encroachment into the Bale Mountains, Awash, Semien Mountains, and Abijata Shalla National Parks is affecting the ecosystems of these parks.

The negative impacts of land use change in these PAs include degradation and shrinkage of natural ecosystems, loss of biodiversity and ecosystem services.

4.1.2. Unsustainable utilization

The unsustainable exploitation of biological resources, including excessive grazing and browsing by livestock, overharvesting of plants, and unregulated hunting, poses a significant threat to biodiversity and the provision of ecosystem services throughout Ethiopia (Mathewos *et al.*, 2023). Such practices degrade habitats and reduce the populations of native species, undermining ecological balance and local livelihoods. A notable example is Lake Tana, where uncontrolled fishing activities have severely impacted the populations of the endemic *Labeobarbus* fish species (Gebremedhin *et al.*, 2019). This pressure is compounded by additional environmental challenges such as soil erosion and the unsustainable extraction and use of water resources for agricultural and infrastructural development. Similarly, overharvesting has threatened timber tree species such as *Hagenia abyssinica* and medicinal plant species such as *Taverniera abyssinica*. Overgrazing/browsing by livestock in many ecosystems, including rangelands, has also contributed to the degradation (increased erosion, decreased quality and productivity of range resources, reduction or elimination of the natural regeneration of woody species and highly palatable forage species) of rangeland ecosystem and other areas. The consequence of these impacts includes ecological disturbance, loss of species and ecosystem services, thereby affecting the livelihoods of the local communities (Alemu *et al.*, 2024).

Moreover, excessive abstraction and drainage of water from lakes and wetlands have led to the loss of habitats and species, as observed in lake Chelekleka, among others. The primary drivers of this degradation include dry-season farming for vegetable and cereal crop production, as well as siltation and increased nutrient loads in the wetlands. These factors contribute to the proliferation of aquatic flora, further disrupting the ecological balance of these ecosystems (Peña *et al.*, 2023).

4.1.3. Invasive alien species

Invasive alien species contribute significantly to biodiversity loss by outcompeting native species for food and habitat, and by altering physical environments in ways that exclude or degrade native ecosystems. In Ethiopia, more than 35 invasive species, both alien and indigenous encroachers have been identified (Shiferaw *et al.*, 2018). These species are having profound negative impacts on agricultural lands, rangelands, national parks, water bodies (including lakes, rivers, and dams), roadsides, and urban green spaces, resulting in substantial impacts and on local biodiversity, and thus, on economic and social costs for the national economy and local livelihoods (Mohammeda and Bahmud, 2023).

Major invasive alien species (IAS) documented in Ethiopia include *Prosopis juliflora* (mesquite), *Parthenium hysterophorus* (parthenium weed), *Eichhornia crassipes* (water hyacinth), *Lantana camara* (lantana weed), *Vachellia* species, *Orobanche*, and *Cuscuta* species. Emerging invasive species, as identified by recent surveys, include *Cryptostegia grandiflora*, *Parkinsonia aculeata*, *Mimosa diplotricha*, *Mimosa pigra*, *Argemone mexicana*, *Nicotiana glauca*, *Senna occidentalis*, *Datura ferox* and *Xanthium strumarium* (Rezene *et al.*, 2012).

Prosopis juliflora has aggressively invaded rangelands across many parts of Ethiopia, particularly the Middle and Upper Awash Valley, the Western and Eastern Hararghe zones, and the lowlands of Afar, Somali, Oromia, Tigray, Amhara, and South Nations Nationalities and Peoples (SNNP) Regional States of Ethiopia (Tamene, 2017; Demillie, 2024). It is displacing more nutritious native browse species, reducing rangeland carrying capacity, increasing the incidence of crop pests, and causing physical injuries (e.g., eye and hoof damage) to both domestic and wild animals, often leading to mortality. According to the Agricultural Bureau of the Afar Region, *P. juliflora* covered approximately 1.7 million hectares of agricultural and rangeland areas of the region (Duguma *et al.*, 2020).

Parthenium hysterophorus is spreading rapidly across rangelands and farmlands in Afar, Somali, Sidama, Central Ethiopia, Southern Ethiopia, Tigray, Benishangul-Gumuz,

Oromia, Amhara, and Gambella regions, causing significant declines in forage production. Sorghum yield losses due to this weed have been recorded between 46% and 97%, depending on location and year. Manual removal of *Parthenium* has also resulted in adverse health effects among farmers, including skin allergies, itching, fever, and asthma. The annual social cost of *Parthenium* invasion in Ethiopia is estimated at USD 4.37 million (Taye Tesema *et al.*, 2016).

Eichhornia crassipes (water hyacinth) is a serious aquatic invader in Lake Tana, the Awash Basin, Lake Zeway (including the Wonji and Koka reservoir areas), Lake Abaya and Baro River. It obstructs irrigation infrastructure and significantly reduces aquatic biodiversity and ecosystem productivity. An impact assessment at the Wonji Shewa Sugar Estate found that water hyacinth infestation across 116.4 hectares of irrigation reservoirs and drainage systems caused water losses ranging from 393,660 to 2,945,160 cubic meters, incurring high management costs (Zerga, 2015).

Table 10: IAS and their distribution in different regions

No	Species	Coverage (ha)
1	<i>Prosopis juliflora</i>	1,584,884
2	<i>Eichhornia crassipes</i>	19,046
3	<i>Parthenium hysterophorus</i>	320,494.5
4	<i>Lantana camara</i>	95,769.5
5	<i>Dactylopius coccus</i>	31,184
6	<i>Striga sp.</i>	92,398.11
7	<i>Calotropis procera</i>	NA
Total	Total area coverage of the major species (ha)	2,143,776.11

Source: Environment, Forest and Climate Change Commission (2021)

Other invasive species such as *Argemone mexicana*, *Lantana camara*, *Cryptostegia grandiflora*, and *Mimosa* species have caused widespread damage by reducing crop and forage yields, displacing indigenous flora, and facilitating the spread of agricultural pests.

As indicated in Table 10, the area covered by the seven major invasive alien species is estimated at 2,143,776.11 ha.

Invasive insects have also posed major threats. For example, the carmine cochineal (*Dactylopius coccus* costa), introduced in 2001 for cochineal dye production (Tesfaye & Zimmermann, 2006; Berhe and Siyum, 2022), has inflicted severe damage on *Opuntia ficus-indica* (prickly pear cactus) in Tigray and other parts of northern Ethiopia, where the cactus is critical for food security, fodder and land rehabilitation.

Indigenous woody encroachers

Encroachment of indigenous woody species has been among the major threats to the livelihoods of pastoralists, biodiversity and ecosystem services. Some of the major woody encroachers in Ethiopia include *Vachellia drepanolobium*, *V. oerfota*, *V. mellifera* and *Commiphora africana*. These woody encroachers have been decreasing grasses and grazing lands resulting in lack of forage resources. Furthermore, encroachments by these woody plants have been causing lower herbaceous biomass, altering soil carbon and nitrogen pools, and contributing to the loss of desirable forage species (Abate *et al.*, 2024).

4.1.4. Climate change

Ethiopia is one of the most vulnerable countries to the adverse impacts of climate change. Climate change is a possible driver of loss of biodiversity and ecosystem services in Ethiopia as evidence of increase in mean annual temperature by about 0.28°C per decade over the last 40-50 years indicates (EPA, 2011). By most measures, exposure and sensitivity are high, and adaptive capacity is low in Ethiopia, and this is attributable to the ecological setting and level of socioeconomic development of the country. High natural climate variability, a large highland area with rugged terrain and steep slopes, and a vast lowland area with arid, semi-arid, and dry sub-humid climates characterize Ethiopia (Tessema and Simane, 2019). The major areas of concern for Ethiopia are human health, agriculture, food security, water resources, energy and infrastructure. The cumulative effect of the multidimensional impacts of climate change is loss of biodiversity and

ecosystem services, which are vitally important for human wellbeing (World Bank, 2024; Degefie & Teferi, 2024).

The vast genetic resources of the country and the presence of well-adapted varieties are invaluable sources of adaptive traits that are important for sustainable agricultural production and adaptation to new climatic conditions. The Seeds for Needs approach implemented by EBI and other research institutions in Ethiopia in collaboration with Bioversity International clearly showed the potential of genetic diversity to provide options to adapt to climate change (Kidane *et al.*, 2022).

Climate change also causes shortage of livestock feeds, disease outbreak, change in disease distribution and shrinkage of rangelands. Furthermore, it causes desertification, forest fire, high evapo-transpiration, and drought. For example, prolonged drought that occurred for consecutive years in Borena zone of Oromia and Somali regions has, reportedly, resulted in loss of animals, especially cattle. The loss of cattle from 2016-2018 in Borena zone of Oromia and the Somali region combined was estimated to lie in between 80,000 and 100,000 (FAO, 2018). During this time, rangelands were degraded and there were shortages of water and feed. In some places, climate change favored bush encroachment by such species as *Vachellia drepanolobium*. Other effects of climate change include loss of traditional institutions and associated knowledge/practices (Abebe *et al.*, 2024).

4.1.5. Replacement of farmers' varieties and breeds

Agricultural biodiversity provides essential raw materials for improving the productivity and quality of crops, livestock, fish and other resources. Due to high attention to the improved varieties, many farmers' varieties/breeds of both plants and animals have been replaced. In Ethiopia, recent years have seen the widespread replacement of traditional farmers' crop varieties and indigenous livestock breeds. In northwestern Amhara, for example, local tef landraces such as Key Tef, Fesho, and rice have been largely abandoned in favor of improved varieties like 'Quncho', driven by yield advantages and market preferences (Tigabu *et al.*, 2022). Similarly, traditional sorghum varieties in South Wollo,

including ‘Kokita’ and ‘Merar’, have been declining due to the promotion of improved types (Teshome *et al.*, 2021).

Ethiopia is among the countries beginning to adopt newly developed genetically modified (GM) crops. The introduction of biotechnology-based crops such as GM cotton and maize holds potential agronomic benefits, including pest resistance and drought tolerance. However, it also poses significant risks to biodiversity. One major concern is the potential genetic loss resulting from the replacement of farmers’ traditional crop varieties with GM alternatives (Lançon & Woldu, 2020). The widespread adoption of GM crops may lead to the erosion of Ethiopia’s rich agricultural biodiversity, as farmers increasingly abandon diverse indigenous seeds that are crucial for resilience against pests, diseases, and climate variability. Moreover, gene flow from genetically modified crops to wild relatives or traditional landraces could cause genetic contamination, disrupt local ecosystems, and accelerate the loss of native crop diversity (Gbashi *et al.*, 2021).

The Sheko cattle is among the threatened local breeds, resulting from interbreeding with the local zebu breed and changes in the production system (Aleme & Mengistu, 2023). Similarly, chicken genetic resources of the country are highly affected by the replacement with exotics and their crosses. Attributed to different factors such as drought, change in production systems, and other social and economic pressures, Borana horse breed has become critically endangered since recently (EBI, 2024b).

4.1.6. Pollution

Improper management of solid and liquid wastes is one of the main causes of environmental pollution and degradation in many places. Many of these places lack solid and liquid waste disposal regulations and proper disposal facilities, including for harmful wastes. Such wastes may be infectious, toxic, or radioactive (Gebrekidan *et al.*, 2024). Poor waste management poses a great challenge to biodiversity, due to the potential of the waste to pollute water, land, air, and vegetation. Potential effects of pollutants on ecosystems and their biodiversity include changes in the abundance of species, loss of species, modification of habitats, reduction in soil, water, and air quality, and changes to the stability and

resilience of ecosystems (Secretariats of the Basel *et al.*, 2021). In rural areas, irrigation, run-off from farming activities containing insecticides, fertilizers, and herbicides that have been applied to crops, are affecting aquatic and wetland organisms. Excessive draining of nitrogen and phosphorus from agricultural fields to freshwater systems has caused excessive plant and algae growth due to eutrophication, which leads to depletion of oxygen as well as to other environmental problems, which in turn will cause loss of species (Abaineh *et al.*, 2024).

Major causes of pollution to aquatic and wetland ecosystem in Ethiopia are large and small-scale factories, which have unregulated waste disposal. Growing vegetables using contaminated water from sources, such as the Akaki River has serious consequences for both human health and the environment. This contamination is largely due to pollutants from major human activities. Consuming vegetables irrigated with polluted water exposes people to heavy metals like cadmium, chromium, copper, mercury, nickel, zinc, and arsenic. These substances can enter the body through ingestion, inhalation, or skin contact (Assegide *et al.*, 2022; Dessie *et al.*, 2024). Long-term exposure can lead to dysfunction of the kidney, liver, lung, and bladder. It is also associated with increased risks of cancer, high blood pressure, skin disorders, and reproductive system issues (Dessie *et al.*, 2024; Temesgen *et al.*, 2024). The deposition of heavy metals into rivers and reservoirs leads to the accumulation of toxins in sediments and aquatic organisms and disrupting the food chain (Menbere *et al.*, 2019).

Pollutants from untreated industrial and urban waste have caused rapid deterioration of surface water quality, leading to the decline of wetland and aquatic habitats. In addition to the Awash River basin and Koche River (Tatek Industrial Zone, Burayu), other studies confirm elevated levels of heavy metals such as arsenic, vanadium, molybdenum, manganese, iron, chromium, and copper in surface waters, often above World Health Organization (WHO) standards. These pollutants pose significant ecological and human health risks, including increased cancer risk, respiratory issues, and cardiovascular problems among communities relying on these water sources for irrigation and domestic use (Assegide *et al.*, 2022).

4.2. Indirect Causes

Factors related to demographics, poverty, lack of awareness, weak coordination, economic policies and institutional arrangements are among the major causes known to indirectly lead to losses to biodiversity and ecosystem services.

4.2.1. Demographic change

Ethiopia's population has grown significantly and is currently estimated at over 111.7 million, of which 83.8 and 27.9 million are living in rural and urban settings, respectively. The country's annual population growth rate is projected at around 2.6% and the population will reach 122.3 million by 2030 (ESS, 2025). Increase in population size suggests declining trends in per capita availability of arable land, grazing land, potable water since more people require more resources. Forests and other habitats will be disturbed or destroyed to construct homes and settlements including towns, businesses and roads for domestic energy production to accommodate needs of the growing population (Cuevas Maia, 2024). As population increases, more land is used for agricultural activities to grow crops and support livestock and decline in species and the number of wild animals, which may lead to extinction as human expansion encroaches into their habitats and limits their mobility and geographic spread.

4.2.2. Poverty

Poverty, particularly in situations where people depend directly upon consumption of biodiversity or other natural resources for survival, is one of the causes of biodiversity losses. Poverty prevents people and nations from assuming long-term economic and environmental attitudes. There exists a vicious circle of poverty, resource degradation and further impoverishment in Ethiopia. Poor farmers, fishermen, pastoralists and other users extract whatever they can from the environment to support their families (Kassa *et al.*, 2018). Official World Bank data shows that Ethiopia's poverty rate fell from around 39% in 2004 to approximately 24% by 2016, but later rose from about 27% in 2016 to 32% by 2021, largely due to inflation, conflict, and structural economic issues. The unemployment rate in urban areas was approximately 8% in 2021 (CSA, 2021), with youth unemployment

remaining particularly high. These economic factors continue to exert significant pressure on the country's biodiversity and ecosystem services.

4.2.3. Low level of awareness and lack of coordination

One of the factors undervaluing contribution of biodiversity and ecosystem services to the national economy and sustainable development is a low level of awareness. Lack of relevant and timely information to the public and decision makers is another factor for loss of biodiversity and unsustainable utilization of resources. Biodiversity and ecosystem services are not well mainstreamed into the formal education system and other relevant sectors. Similarly, community knowledge on biodiversity, its cultural practices in the management of biodiversity and ecosystems are not well promoted and applied (Lemessa *et al.*, 2022).

The weak integration between environmental and developmental efforts, alongside limited participation from the public and community-based organizations in environmental governance, remains a significant environmental challenge in Ethiopia. Moreover, unsustainable agricultural practices, combined with low levels of environmental awareness continue to accelerate the degradation of natural resources, manifesting in deforestation, soil erosion, and the depletion of water resources (EPA, 2024).

4.2.4. Policies and institutions

Ethiopia has several policies, legislation, standards and plans that are relevant for biodiversity conservation (EBI, 2022). Attributed to different factors, however, the implementation of these legal frameworks at the grassroots level is limited.

There are several stakeholders working on biodiversity conservation and sustainable utilization. However, further strengthening of coordination of the stakeholders is required for the effective conservation and sustainable utilization of biodiversity and ecosystems. Summary of threats, root causes, consequences and gaps associated with biodiversity loss in Ethiopia is presented in Annex V, and summary of threats to Ethiopia's biodiversity and their root causes are presented in Annex VI.

CHAPTER FIVE

5. BIODIVERSITY GOVERNANCE AND INSTITUTIONAL ARRANGEMENTS

5.1. Institutional Frameworks

Ethiopia has a multi-tiered institutional arrangement to implement its biodiversity strategy (Et NBSAP 2025-2030). At the center of this institutional framework is the Ethiopian Biodiversity Institute (EBI), which has the statutory mandate to coordinate and oversee the conservation of plant, animal, microbial biodiversity, and associated traditional knowledge, and administer access and benefit-sharing (ABS) processes. EBI works closely with the Regional States through establishing biodiversity centers, which serve as focal points to implement and foster biodiversity mainstreaming.

Several key sectoral institutions contribute to biodiversity governance. The Ministry of Agriculture promotes agrobiodiversity, land-use planning, and has been engaged in natural resource management that support biodiversity conservation, while the Ethiopian Forest Development (EFD) is in charge of forest resource conservation and development. On the other hand, the Ethiopian Institute of Agricultural Research (EIAR) supports the conservation and sustainable utilization of agrobiodiversity through research and agricultural technology development. The Ethiopian Environment Protection Authority is in charge of environmental issues which include management of biodiversity and ecosystems. The Ethiopian Wildlife Conservation Authority is mandated to managing different types of protected areas, and the Ministry of Tourism supports biodiversity through the promotion of eco-tourism. These institutions, alongside higher learning institutions, regional bureaus of agriculture, forest and wildlife authorities, and pastoral agencies, form a network of actors critical to achieving NBSAP (2025-2030). The institutions' roles in conservation and sustainable use of biodiversity are supported by different legal frameworks. However, there are certain limitations in coherence and alignment among the institutions.

5.2. Policy and Legal Frameworks

At the apex of Ethiopia's legal hierarchy is the Constitution of the Federal Democratic Republic of Ethiopia (Proclamation No. 1/1995), which integrates environmental protection as a constitutional right and imposes duties on the state and citizens to safeguard the environment for present and future generations. The constitutional provision under Article 44 recognizes the right of peoples to a clean and healthy environment and mandates equitable resource use, forming a cornerstone for biodiversity-related legislation.

The constitution also enshrines environmental protection as a constitutional right and duty, emphasizing the responsibility of both the state and citizens to safeguard the environment for current and future generations. Complementary frameworks include the Access to Genetic Resources and Community Knowledge Proclamation (No. 482/2006), which regulates the use of biological resources through prior informed consent and benefit-sharing arrangements; the Environmental Impact Assessment Proclamation (No. 299/2002), which integrates biodiversity considerations into development planning; and other sectoral laws such as the Forest Proclamation (No. 1065/2018), Plant Breeders' Rights Proclamation (No. 1068/2017), and Seed Proclamation (No. 1288/2023).

Ethiopia has built a robust legal foundation for biodiversity conservation and the sustainable use of genetic resources, anchored in its early ratification of the Convention on Biological Diversity (CBD) in 1994 through Proclamation No. 98/1994. The country is also a signatory to several international biodiversity-related treaties, including CITES, CMS, the World Heritage Convention, and AEWa, reflecting its commitment to global biodiversity governance. These international obligations are translated into national laws through a suite of legislative instruments that address conservation, sustainable utilization and benefit-sharing accrued from the use of genetic resources, environmental protection, forest and wildlife conservation, and community knowledge systems.

The important legal frameworks and their relations with the Eth. NBSAP 2025-2030 have been discussed below.

5.2.1. Government policy frameworks

In this section, the various governance policy frameworks related to biodiversity and ecosystem services, given under different sectors and time frames, are presented and further reinforced by the synthesis tabulated.

Ethiopia's Agricultural and Rural Development (ARD) Policy (2024)

Ethiopia's Agricultural and Rural Development (ARD) Policy supports biodiversity through integrated land use, agroecological zoning, and participatory resource management, while its emphasis on sustainable intensification and eco-friendly practices contributes to restoration (Target 2), soil and water management (Target 2, 8, 10), and spatial planning (Target 1). The policy promotes improved land tenure and collective resource management, aiding the conservation of forests, wetlands, and agrobiodiversity. It also recognizes the importance of indigenous knowledge and local seed systems (Targets 4 and 10), encourages the development of community institutions and farmer cooperatives for equitable benefit-sharing (Target 12), and advances agroforestry and environmental rehabilitation to support ecosystem services and climate adaptation (Targets 3 and 8). Establishing biodiversity monitoring systems, integrating biodiversity safeguards into land use and investment planning, protecting traditional genetic resources, and strengthening institutional and cross-sectoral coordination to align with NBSAP targets are beneficial.

Ethiopia's National Water Policy (2001)

Ethiopia's National Water Policy contributes significantly to biodiversity conservation by promoting sustainable water use, which aligns with spatial planning (Target 1) and enhances climate resilience (Target 8). The policy supports wetland restoration (Target 2) and soil conservation efforts (Target 8), while also enforcing environmental impact assessments and ensuring adherence to water quality standards. Additionally, it supports the management of protected areas (Target 3) and contributes to reducing aquatic pollution (Target 7). The policy further promotes sustainable aquaculture and the responsible use of water resources (Target 2), alongside fostering capacity-building initiatives (Target 16). A

major issue is the absence of effective enforcement mechanisms and poor coordination among institutions, which weakens *in situ* conservation efforts (Target 4) and limits the integration of biodiversity data into national systems (Target 17). It is important to enforce biodiversity impact assessments for all water-related projects and strengthen legal protections for wetlands.

Ten-Year Development Plan (2021–2030)

Ethiopia's Ten-Year Development Plan (2021–2030) offers important contributions to biodiversity through its focus on a Resilient Green Economy, which supports ecosystem restoration (Target 2) and climate adaptation (Target 8). The integration of climate strategies contributes to pollution control (Target 7) and supports broader ecosystem restoration goals (Target 2). To improve biodiversity outcomes, it is important to embed biodiversity considerations into urban planning and land-use zoning. Dam and water infrastructure projects should be subject to strict biodiversity protection measures, while extractive industries must be required to apply effective biodiversity offset mechanisms (Target 14). In addition, introducing biodiversity-based economic incentives and strengthening biodiversity-specific environmental impact assessments will support more sustainable development.

Homegrown Economic Reform Agenda (2020)

The Homegrown Economic Reform Agenda (2020) contributes to biodiversity goals by integrating environmental considerations into economic governance. Ethiopia's Climate-Resilient Green Economy supports biodiversity through improving crop and livestock production practices, protecting and re-establishing forests for their economic and ecosystem services, including as carbon stocks. It has integration with national economic policies (Target 13) and strengthens compliance mechanisms (Target 14), although biodiversity-specific initiatives and funding remain limited. Agricultural reforms advance biodiversity-friendly farming (Target 10) and forest restoration (Target 2), while ecotourism development supports sustainable biodiversity use (Target 9) and protected

area management (Target 3). Despite notable contributions, several critical challenges remain. Infrastructure development often moves forward without sufficient biodiversity safeguards, resulting in ecosystem fragmentation (Target 2, 3) and a heightened risk of invasive species (Target 6). In the mining and industrial sectors, the absence of biodiversity-focused regulations contributes to land degradation (Target 2) and increased pollution (Target 7). Rapid urban expansion, without biodiversity-sensitive planning, undermines green infrastructure (Target 11) and accelerates habitat loss (Target 2 and 3).

Environmental Policy of Ethiopia (1997)

The Environmental Policy of Ethiopia (1997) laid foundational principles for biodiversity and natural resource conservation, contributing to *in situ* and *ex situ* biodiversity conservation (Targets 4 and 5) and the safeguarding of endangered species (Target 5). It promotes ecosystem-based water management, supporting upstream wetland and river protection (Target 2) and maintaining water quality (Target 7), though enforcement in large-scale infrastructure remains weak. The policy also encourages sustainable agriculture (Target 10) and land resilience (Target 8), along with reforestation and restoration initiatives (Target 2), contributing to climate mitigation (Target 8). Its emphasis on community participation enhances local conservation efforts and capacity building (Targets 16 and 18). Despite its strengths, the policy continues to face significant challenges. Biodiversity considerations are frequently overlooked in hydropower development, leading to habitat loss (Target 3) and the disruption of aquatic ecosystems (Target 6). Urban and industrial expansion often lacks biodiversity safeguards, resulting in the degradation of ecological corridors (Target 2) and increased pollution levels (Target 7). To address these challenges, it is essential to embed biodiversity concerns within land-use and water resource planning processes. All major development projects should be subject to biodiversity-specific environmental impact assessments. A national strategy targeting invasive species, underpinned by strong legal frameworks, should be developed.

Forest Development Policy (2007)

The Forest Development Policy (2007) plays a significant role in advancing biodiversity goals by promoting sustainable forest management, which helps conserve forest ecosystems and prevent the spread of invasive species (Targets 2 and 6). Through Participatory Forest Management (PFM), the policy supports equitable natural resource use (Target 12) and strengthens community capacity for conservation (Target 16), although broader implementation is hindered by funding and technical limitations. It also prioritizes the conservation of indigenous species, contributing to the protection of local genetic resources (Targets 4 and 5), while agroforestry practices enhance ecosystem and soil health (Targets 8 and 10) when carefully managed. Measures to control illegal logging further support resource sustainability and compliance with biodiversity laws (Targets 9, 13 and 14). However, key gaps remain to be resolved including monoculture plantations driven by market incentives which reduce ecosystem diversity and resilience (Targets 3 and 9). The continued use of exotic species without sufficient regulation poses risks to ecosystems (Targets 6 and 7). Enhanced enforcement against illegal logging and improved monitoring mechanisms are also critical to securing biodiversity outcomes.

Industry Development Strategy (2013–2025)

The Industry Development Strategy (2013–2025) presents multiple opportunities to support biodiversity goals, particularly through its focus on agro-processing industries that encourage sustainable agriculture and responsible resource management (Targets 10 and 9). However, the risks associated with monoculture practices require continued vigilance. The strategy also enhances the protection of genetic resources and promotes equitable benefit-sharing (Targets 5 and 12), though stronger measures are needed to prevent bio-contamination. By advancing labor-intensive industries, the strategy indirectly aids biodiversity conservation through creation of alternative livelihood opportunities and reduced pressure on ecosystems (Targets 18). Its emphasis on linking farmers with industries fosters land-use practices that are more aware about biodiversity (Targets 10 and

13), while export-oriented growth can support sustainable trade (Targets 9 and 12) if supported by effective biodiversity certification and traceability systems.

The strategy poses several biodiversity-related concerns. The rapid expansion of industrial zones leads to habitat fragmentation and heightens the risk of invasive species (Targets 3 and 6). Additionally, unsustainable sourcing of raw materials contributes to ecosystem degradation (Targets 2 and 3), disrupts wildlife habitats and natural ecosystems (Targets 7). Addressing these challenges requires the enforcement of biodiversity-sensitive environmental impact assessments (EIAs) across all industrial activities.

Biodiversity Conservation and Research Policy (1998)

The Biodiversity Conservation and Research Policy (1998) laid an early foundation for advancing biodiversity conservation in Ethiopia. It supports the conservation of ecosystem and genetic diversity (Targets 2, 4 and 5) through efforts led by federal, and regional governments, though coordination challenges continue to limit enforcement. The policy promotes the integration of biodiversity into national and sectoral development plans (Targets 13,14 and 18), and emphasizes the importance of biodiversity information systems to enhance data-driven planning and decision-making (Targets 16, and 17). Enhancing the policy's effectiveness requires increased biodiversity financing (Target 19), particularly through public-private partnerships.

Agricultural Extension Strategy (2017–2030)

The Agricultural Extension Strategy (2017–2030) promotes biodiversity by supporting sustainable agriculture that enhances climate resilience and land conservation (Targets 7 and 8). It offers tailored advisory services to encourage biodiversity-friendly farming practices (Targets 10) and fosters sustainable market linkages that protect biodiversity (9). The strategy also aims to improve institutional coordination between the agriculture and biodiversity sectors to better align agricultural development with biodiversity goals (Targets 10 and 18). Farmer Training Centers (FTCs) play a role in promoting ecosystem

restoration and regulatory compliance (Targets 2 and 14). It is essential to build the capacity of extension staff in biodiversity-conscious practices, foster the development of market incentives that support ecological sustainability, enhance coordination between the Ministry of Agriculture, EBI, and local authorities, increase budget allocations for biodiversity initiatives at FTCs, and ensure that biodiversity is fully integrated into broader agricultural policy frameworks.

Long-Term Low Emission and Climate Resilient Development Strategy LT-LEDS (2020–2050)

Ethiopia's Long-Term Low Emission and Climate Resilient Development Strategy (LT-LEDS) 2020–2050 contributes to biodiversity conservation by promoting climate-resilient agriculture and agroecological practices that support land restoration (8 and 10). It emphasizes forestry and land use reforms that enhance ecosystem restoration and carbon sequestration (Targets 2 and 8), with the Green Legacy Initiative, a nationwide reforestation and land rehabilitation program, serving as a flagship component to achieve large-scale tree planting, degraded land recovery, and ecosystem resilience. It advocates for a transition to sustainable energy that reduces environmental harm (Targets 13, 14 and 15) and supports biodiversity-sensitive infrastructure development (Target 16). The strategy also encourages green value chains, promoting sustainable markets and biodiversity-based products (Targets 12 and 14). Despite the progress made so far, biodiversity considerations remain insufficiently integrated in the climate actions across major sectors. Agroecological approaches are not adequately reflected in agricultural strategies, hence increasing monoculture expansion and associated ecosystem degradation (Targets 7 and 10). It is essential to fully incorporate biodiversity into agroecological and climate adaptation programs, ensure all energy infrastructure undergoes biodiversity-specific EIAs, and promote decentralized, low-impact renewable energy solutions.

Wildlife Policy (2011)

The Wildlife Policy (2011) advances biodiversity conservation through enhanced habitat protection, supporting protected areas and spatial planning efforts (Targets 1 and 3). It promotes the conservation of endemic and threatened species via both *in situ* and *ex situ* measures (Targets 4 and 5), though genetic resource management requires strengthening. The policy encourages regulated wildlife use to sustain trade and resource use (Targets 9 and 12), while eco-tourism development fosters conservation financing and community engagement (Targets 18 and 19). Enforcement challenges caused continued poaching and illegal wildlife trade continue to weaken conservation efforts. In addition, wildlife is not adequately mainstreamed into land-use planning processes, contributing to habitat fragmentation (2). Limited involvement of local communities' further limit support for biodiversity conservation at the grassroots level (Targets 18).

Seed System Development Strategy (2016)

The Seed System Development Strategy (2016) supports biodiversity conservation through the preservation of indigenous seed diversity, contributing to genetic resource conservation (Targets 4 and 5). It promotes sustainable seed production aligned with biodiversity-friendly farming practices (Target 10), and encourages community-based seed systems that integrate traditional knowledge and local participation (Targets 12 and 18). Agro-ecological zoning within the strategy enhances ecological balance and climate resilience (Targets 1). Despite its contributions, the strategy carries significant risks, including genetic erosion from the commercial expansion of seed systems, which may result in the loss of local crop varieties (Targets 5). It is important to enquire biodiversity-sensitive seed certification and environmental impact assessments (EIAs). Greater support should be given to indigenous seed banks and participatory breeding initiatives.

Livestock and Fisheries Extension Strategy (2023–2033)

The Livestock and Fisheries Extension Strategy (2023–2033) contributes to biodiversity goals by promoting sustainable grazing and aquaculture practices that build ecological resilience and conserve resources (Targets 8 and 10 and). Mobile extension services broaden access to biodiversity-sensitive training, supporting local capacity and community engagement (Targets 16 and 18). Conservation of water and grazing resources reduces land degradation and encourages sustainable use (Targets 2 and 9). The strategy also facilitates sustainable market linkages that promote benefit-sharing and responsible commercialization (Targets 12 and 14). Implementation challenges include risks of overgrazing due to increasing livestock beyond carrying capacity, which causes habitat degradation (Targets 6 and 7). Moreover, fisheries management practices pay less attention to biodiversity, risking overfishing and loss of species (Targets 5 and 7). To address these gaps, the strategy should develop biodiversity-sensitive guidelines for grazing and fisheries management, aquaculture development and promote ecosystem-based resource management systems.

Agroforestry Strategy (2020–2030)

The Agroforestry Strategy (2020–2030) advances biodiversity and ecosystem resilience by promoting sustainable land management that supports ecosystem restoration and climate adaptation (Targets 2, 8 and 10). It encourages climate-resilient agroforestry practices, fostering sustainable biodiversity use (Targets 9 and 14), and supports agroforestry-based livelihoods that contribute to sustainable incomes and community conservation efforts (Targets 12). Integration with land-use policies enhances spatial planning and ecosystem connectivity (Targets 1 and 3). Monitoring of biodiversity impacts within agroforestry research remains limited, which weakens the alignment of agroforestry policies with national biodiversity objectives (Targets 9 and 13). It is important to integrate biodiversity indicators into agroforestry monitoring systems, allocate greater financial resources to

support biodiversity-friendly practices, and establish certification schemes that promote sustainable agroforestry products.

Watershed Development Strategy (2019)

The Watershed Development Strategy (2019) contributes to biodiversity conservation by promoting ecosystem restoration through watershed management, supporting land and water restoration efforts (Targets 2 and 8). Community-based initiatives play a key role in enhancing biodiversity resilience. The strategy also advances soil and water conservation practices that foster climate adaptation and prevent land degradation (Targets 7 and 8). The lack of biodiversity-specific indicators hampers effective monitoring and evaluation of conservation outcomes (Targets 13 and 17). To improve conservation outcomes, biodiversity indicators should be incorporated into watershed project assessments. Aligning watershed planning more closely with NBSAP targets further strengthen conservation efforts.

5.2.2. Legislative frameworks

Ethiopia's Access to Genetic Resources and Community Knowledge, and Community Rights Proclamation no. 482/2006 (ABS Proclamation)

The ABS Proclamation is a legal framework that directly supports Ethiopia's biodiversity agenda by regulating access to genetic resources and associated community knowledge. It promotes the fair and equitable sharing of benefits arising from the utilization of these resources (Target 12), ensuring that local communities are recognized and rewarded for their contributions to biodiversity conservation and related knowledge systems. The proclamation mandates prior informed consent and mutually agreed terms for access, reinforcing ethical and equitable biodiversity governance (Targets 13 and 14).

The ABS Proclamation strengthens the conservation of genetic resources by restricting unauthorized collection and export, thereby supporting *in situ* conservation efforts (Target 2, 3, and 4,) and encouraging sustainable use of indigenous genetic resources. It provides

legal recognition of community rights over genetic resources and traditional knowledge, aligning with global commitments under the Nagoya Protocol and reinforcing national efforts to document and protect agrobiodiversity (Targets 4 and 10). It also contributes to building national databases and registries of genetic resources and knowledge, thus enhancing biodiversity monitoring systems (Target 17).

Ethiopia's Biosafety Proclamation No. 655/2009 (as amended by Proclamation No. 896/2015)

The Biosafety Proclamation establishes Ethiopia's primary legal safeguards around the use of genetically modified organisms (GMOs), aligning strongly with biodiversity protection and precautionary approaches. Its core objective to prevent adverse effects of GMOs on human and animal health, biodiversity, and the environment directly supports NBSAP goals related to risk reduction and ecosystem resilience (Targets 7 and 8). The requirement for advance informed agreement (AIA) before GMO release, and special permits for research use, reinforces national sovereignty over genetic resources and bolsters safeguards for *in situ* biodiversity conservation (Targets 3 and 4). Additionally, the proclamation mandates scientific risk assessments, risk communication, and environmental monitoring, contributing to biodiversity-inclusive policy development and ensuring adherence to biosafety protocols (Target 15). The provisions regulating the importation, contained use, and transit of GMOs serve to mitigate the risks of genetic contamination and unintentional environmental release, helping prevent harm to species and ecosystems (Targets 2,3 and 4).

Forest Development, Conservation and Utilization Proclamation No. 1065/2018

This proclamation promotes biodiversity by recognizing forest ecosystems, supporting restoration, mitigating land degradation (Target 2), and enabling community forest ownership (Target 3). It encourages sustainable forest development through management planning (Target 2, and 3), participatory approaches (Target 18), and spatial classification into protected and production forests (Targets 2 and 3). It provides legal recognition for

forest ecosystem services (Target 13 and 14) and forest carbon trade (Target 8) and supports climate resilience goals. However, it lacks robust enforcement (Targets 13 and 14), biodiversity monitoring (Target 17), and coordination between regional and federal institutions.

Payment for Ecosystem Services (PES) Proclamation (2025)

The PES Proclamation introduces market-based incentives for biodiversity conservation, rewarding voluntary actions like afforestation and wetland restoration (Target 2). It supports landscape-level planning (Target 1), ecosystem connectivity, and recognizes multiple ecosystem services: cultural, regulating, and provisioning (Targets 3 and 10). Governance provisions include transparent, performance-based contracts, clear institutional roles, and benefit-sharing mechanisms (Targets 12), with public-private partnerships promoting equitable biodiversity financing (Target 19). Integrate PES to biodiversity-friendly agriculture (Target 10) and protected area system, and ensure equitable benefit sharing for marginalized groups (Target 18) while strengthening monitoring and capacity.

Rural Land Administration and Use Proclamation No. 1324/2016

This law supports biodiversity through securing land tenure, sustainable land use, and the prevention of land degradation (Targets 2). It promotes inclusive governance (Target 18) and benefit sharing (Target 12), enabling community participation in land management. Land-use planning and certification help identify biodiversity-sensitive zones (Target 1), while agroecological zoning aligns with sustainable farming (Target 10).

The law encourages conservation through promoting controlled grazing and crop rotation (Target 2, 10), and promotes genetic diversity in agriculture (Target 4 and 10). However, it lacks mandatory biodiversity impact assessments (Target 13,14), fails to integrate indicators in biodiversity monitoring (Target 17). Integrate biodiversity assessments into

land certification, incentivize biodiversity-friendly farming, embed biodiversity indicators into monitoring systems, and enhance coordination with conservation bodies.

Plant Breeders' Rights Proclamation No. 1068/2017

This proclamation incentivizes innovation in plant breeding (Targets 4 and 10), fostering improved crop productivity and resilience (Targets 8 and 10), while recognizing traditional rights and knowledge in variety development (Target 17). It mandates that conserved varieties meet criteria like distinctness and stability, contributing to biodiversity data (Targets 4, 5 and 17), and enables monitoring through a national registry. Nonetheless, the law lacks provisions on biodiversity impact assessments for new varieties (Target 17). Community benefit-sharing (Target 12) is inadequately addressed. Integrate biodiversity safeguards in variety assessments, ensure benefit-sharing for use of local genetic resources, align with biosafety frameworks, and strengthen collaboration with gene banks and seed systems.

Seed Proclamation No. 1288/2023

This law modernizes Ethiopia's seed regulatory system, promoting genetic resource use (Target 4), climate-resilient seeds (Target 8). It recognizes community seed systems and farmers' varieties, supporting indigenous genetic resource conservation (Targets 4 and 5). The national seed catalogue and inspection authority reinforce data and governance frameworks (Targets 16 and 17). However, the proclamation does not mandate biodiversity assessments (Target 17) and overlooks potential genetic erosion from uniform varieties (Target 17). Farmers' rights and benefit-sharing mechanisms (Target 12) are vague. Include biodiversity risk assessments in seed approvals, establish benefit-sharing for farmers' varieties, align with biodiversity strategies, and support seed banks and community-led conservation.

Agricultural Production Contracts Proclamation No. 1289/2023

This law introduces formal contracts between producers and buyers, enhancing traceability and resource management (Target 10), potentially supporting agrobiodiversity (Target 4). It allows for inclusion of sustainability standards and responsible input use (Target 7, 10). The law does not include biodiversity assessments (Target 17) or provisions for local varieties and benefit-sharing (Targets 4, 5, 12). It embeds biodiversity safeguards in contract clauses, support agroecological practices, conserve local varieties, and link contract systems with national biodiversity strategies and monitoring tools.

Development, Management and Utilization of Community Watersheds Proclamation (2023)

This proclamation integrates ecosystem-based principles into watershed planning, mandating participatory, land-use-based rehabilitation using local species and agroforestry (Targets 1, 2, 3, 8). It promotes climate-smart practices like rotational grazing and water harvesting (Target 8), strengthens ecological connectivity (Target 3), and empowers communities with legal responsibility (Target 16). Alignment with national policies, enhances coherence, and capacity-building provisions support adaptive management (Target 16). Incorporate biodiversity goals and indicators into watershed plans, recognize traditional ecological knowledge, and link to protected area and biodiversity finance mechanisms.

CHAPTER SIX

6. LESSONS FROM THE PREVIOUS NBSAPS IMPLEMENTATION AND REVISION

6.1. Lessons Learned from Previous NBSAPs

The second Ethiopian National Biodiversity Strategy and Action Plan (Eth. NBSAP 2015-2020) was updated based, *inter alia*, on global provisions, national circumstances and lessons learned from the planning and implementation processes of the first Ethiopia's National Biodiversity Strategy and Action Plan (Eth. NBSAP 2005-2010). It was updated in a way that it can serve as a roadmap to enhance conservation and sustainable utilization of the country's biodiversity and contributions of the latter to the overall development of the country. The Eth. NBSAP 2015-2020 presented the biodiversity resource base and values of biodiversity and ecosystem services of the country to the livelihoods of Ethiopians and the national development, causes and consequences of their losses, institutional and legal frameworks related to biodiversity and ecosystem services as well as lessons learned from the previous one. It also contained shared global vision, mission, goals as well as principles and 18 targets that were mapped with the Aichi Biodiversity Targets (2011-2020), each of which had rationale, milestones and implementation strategies that were specific to the targets.

The implementation arrangements section addressed the coordination of planning and implementation, resource mobilization, the clearing-house mechanism, as well as monitoring, evaluation, and reporting.

As reported in the Sixth National Report to the Convention on Biological Diversity (CBD), the overall implementation level of the Eth. NBSAP 2015-2020 was found to be effective. The status of implementation of 10 of the 18 (55.56%) targets of the Eth. NBSAP 2015-2020 was indicated as green, which means the implementation status was effective or beyond the expectation, while that of seven and one were indicated in yellow and red,

which represents the implementation status as “partially effective” and “not effective”, respectively.

The Ethiopian Sixth National Report to the CBD indicated also that the observed lags in the status of implementation of the eight targets was largely attributed to lack of commitment by lead institutions either to satisfactorily execute the tasks or coordinate the execution by collaborating stakeholders as stipulated in the strategy. Moreover, inability to secure adequate financial resources for the implementation, absence of national data sharing mechanism, lack of a mechanism that ensures better enforcement of the agreed implementation arrangements, and failure to put in place effective NBSAP coordination structure at the national level were the other challenges observed during the implementation period.

Therefore, the most valuable lessons learned from the past experiences include putting in place a resource mobilization strategy with major emphasis to internal resources as well as the importance of putting in place effective coordination mechanism that brings together lead and collaborating implementing agencies. In addition, creating a mechanism that links the Coordinating Institution - namely, the Ethiopian Biodiversity Institute - to grassroots implementing agencies in the regional states, rather than leaving them to be communicated through federal lead agencies only, will enhance the efficient and effective implementation of the Strategy.

6.2. The Process of Revising the NBSAP

The developments of NBSAPs follows the provisions of Article 6 of the Convention on Biological Diversity (CBD), and the need for the present updating was based on CoP 15/6 decision “Mechanisms for Planning, Monitoring, Reporting and Review: which requests Parties to revise and update their national biodiversity strategies and action plans in accordance with Article 6 of the Convention, following the guidance provided in its Annex I to the Decision, aligned with the Kunming-Montreal Global Biodiversity Framework and its goals and targets, including those related to means of implementation, and to submit

them through the clearing-house mechanism by the sixteenth meeting of the Conference of the Parties”.

The updating process takes into account also the whole of the government- the whole of society approach involving all segments of the society and policy makers so as to mobilize citizens in the implementation of the updated Eth. NBSAP 2025-2030 and ensure informed decision-making processes leading to inclusive and adaptive governance related to conservation, sustainable use of biodiversity and ensure fair and equitable sharing of the benefits accrued from the use of genetic resources, taking into account favorable national circumstances such as the Green Legacy Initiative.

Ethiopia is one of the beneficiaries of the Global Environmental Facility (GEF) Enabling Initiative, the Global Biodiversity Framework- Early Action Support Project, that was implemented through the United Nations Environment Programme (UNEP). The Initiative was designed to help countries fast-track their readiness and early actions to accelerate the updating and implementation of their NBSAPs in line with the Kunming-Montreal Global Biodiversity Framework (K-M GBF). Using this Initiative, Ethiopia has finalized development of four of the Project Components, namely: Rapid review of NBSAP for alignment with the Post-2020 GBF, assessment of monitoring systems, policy and institutional alignment and review for coherence with GBF, and biodiversity finance activities. The aligned Ethiopia's Biodiversity targets with K-M GBF Goals and Targets were submitted to the Secretariat of the CBD using its Annex I on-line as requested by the CoP 15/6. The other three outcomes of the Project have been used as separate chapters of the updated Eth. NBSAP 2025-2030.

In order to discharge four of the components of the above Project; the Ethiopian Biodiversity Institute (EBI), the National Focal Point to the CBD, has gone through cascaded steps starting from assigning Project Coordinator and establishing the Project Planning and Implementation Team (PPIT) at the EBI level. The team is assigned to set stages for further actions that require subsequent decisions by the National Steering

Committee (NSC) before they are presented for final validation by the National Biodiversity Platform (NBP).

Accordingly, the *ad hoc* team proposed the institutional and professional composition of the NSC and Technical Team (TT) from various institutions. This proposal was presented to the PPIT at its meeting on 20–21 May 2023 for refinement. Subsequently, it was submitted to the NSC at its first meeting on 30 November 2023 for further review and approval of the Team's institutional and professional composition. The TT is a group of various experts that will be involved in development of the four outcomes of the GBF-EAS Project, and in updating the Eth. NBSAP-2025-2030 and developing the Seventh National Report to the CBD. Finally, heads of 28 sector institutions, NGOs, United Nations Environment Programme and United Nations Development Programme, and 33 TT members of various expertise from 19 institutions were approved as NSC and TT members, respectively. Through series of meetings, the TT developed draft targets, which were evaluated and approved by the National Biodiversity Platform (NBP). The NBP is comprised of 131 members that represent seven different categories (outlined in Chapter 8).

The targets were then submitted to the Secretariat of the Convention on Biological Diversity Clearing House Mechanism using Annex I. The Targets have a total of 88 indicators, 124 actions, the implementation of which is to be led by 17 institutions. Lead and collaborating implementing agencies, period of implementation and the overall cost of implementation are indicated at the actions level, and the latter is summed up to targets level specific to those actions.

CHAPTER SEVEN

7. NATIONAL BIODIVERSITY STRATEGY

Globally shared vision, mission and goals of the Kunming-Montreal Global Biodiversity Framework (K-M GBF) have been outlined below.

7.1. Vision

The vision of the Kunming-Montreal Global Biodiversity Framework is a world of living in harmony with nature where “by 2050, biodiversity is valued, conserved, restored and wisely used, maintaining ecosystem services, sustaining a healthy planet and delivering benefits essential for all people.”

7.2. Mission

The mission of the Framework for the period up to 2030, towards the 2050 vision is to take urgent action to halt and reverse biodiversity loss to put nature on a path to recovery for the benefit of people and the planet by conserving and sustainably using biodiversity and ensuring the fair and equitable sharing of benefits from the use of genetic resources, while providing the necessary means of implementation.

7.3. Goals

Goal A: Substantially increase the area of natural ecosystems by maintaining, enhancing, or restoring the integrity, connectivity, and resilience of all ecosystems. Reduce by tenfold the extinction rate and risk of all species, and increase the abundance of native wild species. Maintain the genetic diversity of wild and domesticated species and safeguard their adaptive potential.

Goal B: Ensure nature’s contributions to people are valued, maintained, and enhanced, with those contributions currently in decline being restored.

Goal C: Share the monetary and non-monetary benefits of the utilization of GR, DSI on genetic resources, and TK associated with Indigenous people and local communities. Ensure TK is appropriately protected and

Goal D: Ensure all parties (specifically developing countries) have adequate means to

implement the GBF. This includes financial resources, capacity building, technical and scientific cooperation, and access to technology.

7.4. Principles

The following are basic principles underlying Eth. 2025-2030 NBSAP.

- We work hard to live in harmony with nature;
- We acknowledge and respect the culture, values, innovations, practices and knowledge of local communities;
- We remain alert to control the spread and introduction of invasive species;
- We pay due attention to gender equity in our endeavors of conservation and sustainable utilization of our biodiversity;
- We adapt to and mitigate climate change through proper conservation, development and utilization of our biodiversity;
- We acknowledge active participation of local communities for effective conservation and sustainable utilization of our biodiversity, and access to genetic resources and the fair and equitable sharing of benefits arising from their use;
- We strive for enhancing contribution of biodiversity to food security and poverty eradication; and
- We promote research-based biodiversity conservation.

7.5. National Biodiversity Targets

Development of Ethiopia's National Biodiversity Targets and Actions has been based on the analysis of the existing situations of the country such as the level of threats, government priorities, existing capacity, lessons from the hitherto implementation experiences on the three pillars of the CBD, and associated global provisions of Kunming-Montreal Global Biodiversity Framework (K-M GBF) Goals and Targets. Accordingly, Ethiopia has developed 19 National Biodiversity Targets that would be implemented between 2025 and 2030. These are outlined under the four Strategic Goals of the K-M GBF. Indicators, actions, implementation period and implementing agencies of the Ethiopian Biodiversity Targets (Eth. NBSAP 2025-2030) are presented in Table 11 below. The alignments of the

Eth. NBSAP 2025-2030 Targets to the K-M GBF Targets, and Strategic Goals and corresponding targets of K-M GBF are presented in Table 12 and Annex VII, respectively.

Eth - Target 1: By 2030, areas of high biodiversity importance are spatially planned, effectively managed and increased from the existing 30% to 80%, addressing land-use changes with full participation of stakeholders.

Technical rationale

Ensuring that all high biodiversity areas are under participatory, integrated and biodiversity inclusive spatial planning and effective management systems is crucial for maximizing the effectiveness of conservation efforts. This approach helps strategically locate these high biodiversity areas and manage land use changes to reduce conflicts and maximize ecological benefits. Ethiopia has made concerted efforts in mapping high biodiversity areas. However, given the current trends of increasing environmental degradation and biodiversity loss, the spatial planning and conservation measures implemented thus far remain insufficient to safeguard and sustainably manage biodiversity. Therefore, it is essential to address land use change by enhancing spatial planning and mapping of high biodiversity areas for effective conservation, sustainable management, and the long-term survival of species and the ecosystem services they provide.

Implementation strategy

Strategies for implementation of this target involves a systematic approach to identifying, designating, and managing areas of high biodiversity and ecosystem services. This approach integrates ecological, social, and economic considerations to achieve conservation goals while respecting the rights of local communities. Key aspects include identifying high biodiversity priority areas, establishing protected zones, and implementing management strategies to guide the development and use of land and resources in high biodiversity areas.

Milestone

- By 2027, key biodiversity areas are studied and identified;
- By 2027, capacity gaps identified and necessary capacity built;

- By 2028, key biodiversity areas are prioritized for spatial planning;
- By 2030, spatially planned areas of high biodiversity importance are increased by 50%; and
- By 2030, certification system for the spatially planned and managed areas put in place.

Eth - Target 2: By 2030, forest coverage is increased from 23.6% to 30%, area of degraded wetland decreased by 20% from the existing 27,142.5 km² and degraded terrestrial land decreased by 20% from the existing 85,243 km², extent of conversion of grazing land decreased from 43.7% to 30% through fostering ecosystem-based management approach, thereby ensuring at least 30% of the degraded land is restored.

Technical rationale

Deforestation and land degradation are the major threats to biodiversity in Ethiopia. These pressures have resulted in the loss of many species and reduced ecosystem services in various parts of the country. The Ethiopian government has taken various measures to halt land degradation and deforestation across the country. However, given the increasing pressures on the land and the forest resources, these measures remain insufficient. Urgent measures are therefore required to improve forest cover and reduce land and wetland degradation.

Implementation strategy

Strategies for implementation of this target include designation of *in situ* conservation sites supported by afforestation on degraded lands, landscape restoration, establishing area closures in areas like wetlands and degraded terrestrial lands. Activities such as increasing agricultural productivity will eventually result in a decrease in agricultural land expansion. Additional strategies include creating alternative livelihoods for local communities to help reduce pressure on ecosystems.

Milestone

- By 2030, forest cover is increased from 23.6% to 30%;
- By 2029, 20 % of key wetlands are restored and degradation is reduced by 20%;

- By 2030, degraded terrestrial land reduced by 20%;
- By 2030, extent of conversion of grazing and rangelands reduced to 30% from the existing;
- By 2030, alternative livelihood is increased by 30% and restoration supportive tools are established; and
- By 2030, restoration of 30% degraded lands is achieved through integrated actions.

Eth - Target 3: By 2030, ecologically representative protected areas including biosphere reserves and inland waters are increased from 12 to 30%, while the existing 0.08% ecosystem and species-based *in situ* sites are doubled through enhancing their ecological connectivity and effective management by actively engaging local communities.

Technical rationale

Ecologically representative protected areas, such as biosphere reserves and inland water ecosystems are key areas which play a vital role in biodiversity conservation and maintaining ecosystem services. Most of Ethiopia's protected areas are not ecologically representative. Thus, there is an urgent need to enhance ecological representativeness of these protected areas in addition to increasing their coverage.

Implementation strategy

To ensure ecological representativeness and increase the area coverage of protected areas, a comprehensive implementation strategy is essential. This should involve knowledge-based planning, stakeholder engagement, and adaptive management. Key components of this strategy include assessing ecological, protection, and socio-economic contexts to identify gaps and opportunities for the establishment and management of protected areas. This strategy should also emphasize integrating protected areas into wider landscapes and sectors, while also promoting equity and fair benefit-sharing.

Milestones

- By 2026, gaps in protected areas (PAs) identified, representativeness and species-based *in situ* sites management improved;

- By 2030, ecologically representative PAs increased from 12% to 30%;
- By 2030, ecological connectivity and management effectiveness of *in situ* conservation areas doubled from their current status;
- By 2029, livelihoods of communities near ecosystem and species-based *in situ* sites improved;
- By 2028, management plans of all existing and new PAs revised and developed; and
- By 2030, human-wildlife interactions are effectively managed.

Eth - Target 4: By 2030, *in situ* conservation of agrobiodiversity is increased from 178 to 205 sites for conservation of crop varieties and animal breeds on farm, and management standards of the existing are improved.

Technical rationale

Despite their immense value, agrobiodiversity, including crops and their wild relatives, animal breeds and microbial genetic resources is under serious threat. The main drivers are anthropogenic pressures such as land degradation, deforestation, habitat conversion, unsustainable production practices, and the replacement of traditional crop varieties with high-yielding hybrids, along with natural factors like drought. These challenges are further intensified by climate change, unsustainable agricultural practices, and the introduction of genetically uniform but high-yielding exotic species and/or cultivars. Meanwhile, existing *in situ* conservation efforts are inadequate and face various management challenges.

Implementation strategy

This target is implemented through assessing crops and their wild relatives, animal breeds, forest and rangeland plants and microbial genetic resources followed by identification and prioritization of potential *in situ* sites. Moreover, gaps in the existing *in situ* sites are identified, leading to the establishment of new *in situ* areas and the enhancement of current ones, with the full participation of local communities. This approach aims to preserve the evolutionary processes and adaptive potential of local varieties and breeds, while also

promoting sustainable agricultural practices. Effective implementation requires an integrated, multi-faceted strategy that balances ecological, social, and economic factors.

Milestones

- By 2027, awareness of local communities, extension agents and other stakeholders raised;
- By 2029, increase the number of agrobiodiversity sites from existing 178 (53 of the crops and 125 of the animal breeds) to 205 sites;
- By 2030, improve management standards of existing *in situ* agrobiodiversity sites; and
- By 20230, practiced participatory monitoring and evaluation system.

Eth - Target 5: By 2030, *ex situ* conservation; emphasizing endemic, endangered, economically and ecologically important species of crop varieties of 92,258 accessions, 3,644 accessions of forest and rangeland plant species, 120,000 straws of animal breeds and 1,350 microbial species/strains are increased by 10%, 25%, 50%, and 10%, respectively; and standards of the existing *ex situ* conservation are improved.

Technical rationale

While *in situ* conservation efforts play a vital role in safeguarding agrobiodiversity, they are not sufficient on their own to prevent loss of species. *Ex situ* conservation is seen as a complement to *in situ* conservation, by rescuing threatened species out of their natural habitats. Ethiopia has made tremendous efforts in *ex situ* conservation of agro-biodiversity. While efforts made to conserve agrobiodiversity, *ex situ*, are tremendous, it is insufficient to counteract the increasing loss of agrobiodiversity. Furthermore, the existing *ex situ* conservation efforts lack management effectiveness and also inadequate to rescue the loss of threatened species. Thus, strengthening the *ex situ* conservation efforts of agrobiodiversity, forest and range land plants, animal breeds and microbes; with special

emphasis on endemic, endangered and economically or ecologically important species and breeds is crucial and needs urgent actions.

Implementation strategy

Assessment of conservation status of agro-biodiversity, forest and range land plants, animal breeds and microbes are the major activities of this implementation strategy. Furthermore, collections of priority germplasm, herbarium specimen and animal semen and their conservation under established *ex situ* conservation need to be strengthened. Moreover, improve the management status of existing *ex situ* conservation sites. Implementation of this strategy plays a vital role in safeguarding threatened agrobiodiversity and promoting sustainable agricultural development and readily accessible genetic resources for research, breeding, and other utilization purposes.

Milestones

- By 2026, priority (endemic, endangered, economically or ecologically important) species, varieties, breeds/or strains identified;
- By 2029, management standards of the existing *ex situ* sites improved;
- By 2030, *ex situ* conservation of crop varieties, forest species accessions, straws of semen and strains of microbes increased by 10%, 25%, 50%, and 50%, respectively;
- By 2030, the number of *ex situ* sites (field gene banks, animal gene bank and botanical gardens) increased
- By, 2030, participatory monitoring and evaluation established.

Eth - Target 6. By 2030, proportion of areas invaded by invasive alien species reduced by 50% from the existing 3,949,314 ha through eradicating the existing invasions and preventing their introduction and expansion.

Technical rationale

Invasive alien species are among the major threats to biodiversity and ecosystem services in Ethiopia. They are rapidly spreading into farm lands, aquatic ecosystems and rangelands,

leading to biodiversity loss, reduction of forage and crop yields, and deteriorating water quality, among others. These damages have significantly affected food security, livelihoods, and both human and animal health across many regions of the country. Although Ethiopia has developed a strategy to control and manage invasive species and various efforts such as eradication campaigns have been undertaken by government agencies, these actions remain insufficient compared to the scale and speed of the spread. Therefore, it is crucial to strengthen existing management efforts to reduce the extent of invasion by eradicating current infestations and preventing further introduction and expansion.

Implementation strategy

The implementation strategy of this target includes awareness raising, mass mobilization, eradication, and reducing the area covered by invasive species. These are key components and when combined, can help to prevent the spread, reduce the impact, and even eliminate invasive species from an area

Milestones

- By 2026, the existing strategy on invasive alien species is reviewed and updated;
- By 2029, trends, and impacts of major invasive alien species studied and their distribution mapped;
- By 2028, entry point inspection and control measures towards early detection and prevention of new invasive species enhanced;
- By 2027, developed and adopted innovative technologies for reducing IAS promoted;
- By 2030, areas invaded by major invasive species (Prosopis, Parthenium, Water hyacinth, Lantana, Striga and Cochineal insect) are reduced by 50%; and
- By 2030, a national monitoring and evaluation system is established and operational to assess the effectiveness of invasive alien species (IAS) eradication and control measures.

Eth - Target 7: By 2030, pollution of major ecosystems is reduced by at least 10% from the existing 10 million tones by application of innovative measures, with emphasis on municipal and industrial sources.

Technical rationale

Pollution is among the major threat to biodiversity and ecosystems, leading to habitat destruction and loss of species. Agro-ecosystems, wetland ecosystems, riverine habitats and urban areas in many parts of the country are polluted by agricultural inputs and industrial wastes. Various attempts have been made by the government to halt pollution by municipal and industrial wastes. Given the growing use of industrial chemicals and inappropriate waste disposal mechanisms in the country, the efforts made so far are meager.

Therefore, it is crucial to significantly strengthen and scale up efforts to reduce pollution risks and minimize its impact on biodiversity and ecosystems.

Implementation strategy

This strategy focuses on reducing excess municipal waste, particularly plastics and hazardous industrial chemical discharges into the environment. It also emphasizes raising awareness, controlling pesticide use, and minimizing associated risks. By applying innovative measures, these efforts aim to reduce pollution in major ecosystems, with more attention to municipal and industrial pollution sources.

Milestones

- By 2026, a national assessment is completed to identify major ecosystems affected by pollution and to map the key types, sources, and levels of major pollutants;
- By 2030, pollution from urban, industrial, and agricultural sources reduced by 10%;
- By 2028, regulations and standards of pollution control enhanced and updated for their enforcement; and
- By 2029, innovative technologies and approaches for pollution management are developed, piloted, and promoted for wider adoption.

Eth - Target 8: By 2030, land-based mitigation and adaptation measures contribute to the reduction of at least 152.75 MtCO₂e from the BAU scenario of 346 MtCO₂e, and inter-sectoral coordination towards biodiversity mainstreaming in the climate actions is increased.

Technical rationale

Climate change has become the major threat to biodiversity in recent decades. Land-based mitigation and adaptation measures are crucial for reducing carbon emissions and minimizing the impact of climate change on biodiversity. These measures involve managing land sustainably to capture and store carbon, reducing emissions from land use, and adapting to the impacts of climate change. Therefore, integrating land-based climate solutions into biodiversity conservation strategies is essential to safeguard ecosystems and ensure long-term environmental resilience.

Implementation strategy

This target is implemented through nature-based solutions and ecosystem-based approaches, while minimizing negative effects and fostering positive impacts of climate action on biodiversity. Key measures include the protection and restoration of ecosystems, afforestation and reforestation, sustainable use of bioenergy, and the promotion of low-emission and non-CO₂-intensive technologies. These approaches aim to harness the power of natural systems to mitigate and adapt to climate change while supporting biodiversity conservation.

Milestones

- By 2029, nature positive and climate smart practices in forestry enhanced;
- By 2030, nature positive and climate smart practices in livestock and crop production enhanced;
- By 2029, nature positive industrial approaches strengthened;
- By 2028, efficient alternative energy options increased;
- By 2029, measures that enhance soil and water conservation scaled up; and

- By 2030, inter-sectoral coordination is strengthened to reduce 50.3 MtCO_{2e} of GHG emissions from the BAU projection of 346 MtCO_{2e} in agriculture, forestry, and other land uses.

Eth - Target 9: By 2030, unsustainable utilization of wild genetic resources is reduced ensuring that all uses, including harvesting and trading activities are implemented sustainably, safely and legally.

Technical rationale

Unsustainable utilization of wild genetic resources is a major threat to biodiversity in Ethiopia, contributing to the degradation of species in rangelands, forests, wetlands, and aquatic ecosystems. Therefore, reducing unsustainable practices such as overharvesting and illegal trade in these ecosystems is essential to achieving biodiversity conservation and ensuring the sustainable use of genetic resources.

Implementation strategy

The implementation strategy includes making sure that the use, harvesting, and trading of wild species are safe, legal, and sustainable. Avoiding overexploitation, minimizing negative effects on non-target species and ecosystems, lowering the risk of pathogen spillover, while respecting and encouraging local communities' and indigenous peoples' customary sustainable use practices. To achieve this target, sustainable management of wild genetic resources such as participatory forest management, sustainable rangeland and aquatic ecosystems management practices need to be adopted. These require to undertake assessments on unsustainable utilization of wild genetic resources, enhancing legal wild genetic resources utilization and market expansion, build capacity of law enforcement agencies to detect and address illegal and unsustainable activities, develop sustainable use guidelines for wild genetic resources development and implement regulations and guidelines to control open access over resources on grazing lands, aquatic, wetland and community forests.

Milestones

- By 2026, unsustainable use of wild genetic resources assessed;
- By 2027, legal use and market expansion of wild genetic resources enhanced;
- By 2027, law enforcement capacity to tackle illegal activities strengthened;
- By 2028, regulations for sustainable use of grazing, aquatic, wetland, and communal lands implemented;
- By 2029, sustainable use of wetlands, aquatic ecosystems, forests, and rangelands improved; and
- By 2030, aquaculture and afforestation expanded; non-wood forest product use promoted.

Eth - Target 10: By 2030, biodiversity issues are integrated into agricultural systems through application of biodiversity-friendly practices and use of improved decision support processes in agricultural production systems, where at least 25% of agricultural land is put under agro-ecological practices.

Technical rationale

Agriculture is the cornerstone of Ethiopia's economy and a vital source of livelihoods for millions. As the sector continues to grow and evolve to meet food security and development goals, it is important to ensure that this growth remains sustainable. Emerging evidence shows that integrating biodiversity-friendly practices into agricultural production such as sustainable intensification, agroecology, and the use of innovative decision-support tools can enhance productivity and resilience while also helping to conserve and restore biodiversity. By aligning agricultural development with environmental sustainability, Ethiopia can strengthen the long-term efficiency of its production systems and contribute to national and global biodiversity goals in a mutually reinforcing way.

Implementation strategy

To ensure the long-term sustainability of agriculture in Ethiopia while achieving food security and biodiversity goals, the adoption of biodiversity-friendly practices is essential. Agroecological approaches that combine ecological principles with local knowledge can

enhance soil health, biodiversity, and the resilience of farming systems. The strategy promotes these practices at both farm and landscape levels, such as intercropping, agroforestry, and conservation agriculture, supported by decision-support tools for efficient resource use and adaptive management. Integrating these approaches into agricultural development will strengthen productivity and resilience while contributing to biodiversity conservation and sustainable national growth.

Milestones

- By 2026, a strategy that promotes agroecological practices developed;
- By 2027, biodiversity-friendly practices, and use of improved and innovative technologies increased;
- By 2027, farmers' capacity towards the adoption and implementation of agroecological practices developed;
- By 2027, community knowledge, innovation and practices for implementing agroecological principles identified and integrated;
- By 2028, agro-ecological productions systems and products certification scheme established;
- By 2029, market linkage for agroecological produces created and value addition promoted; and
- By 2030, at least 25% of agricultural land put under agro-ecological practices.

Eth - Target 11: By 2030, 75 urban centers put 30% of their land under spatially planned green areas through biodiversity-inclusive urban planning.

Technical rationale

Urban green areas play a crucial role in promoting human well-being by offering numerous mental, physical, and social benefits. Ethiopia is greening its urban areas. However, most of the urban areas are not under spatially planned green areas. Spatially planned green areas specially through a biodiversity-inclusive approach, enhance urban ecosystem services and contribute to biodiversity conservation, while benefiting human well-being.

Implementation strategy

By mainstreaming biodiversity conservation and sustainable use, we can ensure biodiversity-inclusive urban planning, significantly expand the area, quality, connectivity, and benefits of green and blue spaces in urban areas. It also contributes to inclusive and sustainable urbanization as well as the provision of ecosystem functions and services to the urban population. Enhancing biodiversity conservation, ecological connectivity and integrity, human health and well-being, and the connection to nature are possible through increasing the specially planned green and blue spaces in urban centers. These endeavors need the identification and mapping of priority locations for green and blue infrastructures, mainstreaming principles of green and blue areas in urban centers as well as establishing basic green and blue infrastructures in urban centers. To ensure biodiversity-inclusive urban spatial planning, the country will implement strategies including: developing and applying biodiversity-integrated urban plans; promoting nature-based solutions in urban design; and strengthening institutional capacity and coordination.

Milestones

- By 2026, priority locations for green and blue infrastructures identified and mapped and standards of the existing areas enhanced;
- By 2027, principles of green and blue spatial planning into urban development mainstreamed and public-private joint implementation fostered;
- By 2029, basic urban green and blue development facilities established; and
- By 2030, 30% of the urban areas of 75 urban centres transformed into spatially planned green and blue areas.

Eth - Target 12: By 2030, access to genetic resources for research and development of 294,616 crop and horticulture accessions, 5700 forest and rangeland plants accessions, 9,000 straws of semen of domestic animals, 620 accessions of microbial species/strains and 1500 access permits are increased by 32%, 18%, 67%, 17% and 55%, respectively and value addition and market linkage are carried-out for at least 18 biological commodities.

Technical rationale

Access and Benefit Sharing (ABS), established under the Convention on Biological Diversity, aims to ensure fair distribution of benefits from the use of genetic resources. However, due to limited capacity, weak enforcement, and poor follow-up, the current ABS system has failed to deliver significant benefits to the country and local communities. This has hindered conservation efforts and economic potential. Strengthening ABS mechanisms through improved access, equitable benefit-sharing, and better regulation is essential for safeguarding biodiversity and supporting sustainable national development.

Implementation strategy

Implementation of this target will require identification of potential genetic resources for access (bio-prospecting), market promotion of bio-prospected species, capacity building and awareness raising on ABS at various levels and implement the ABS rules and regulations to ensure equitable sharing of benefits arising from the access. Moreover, bio-piracy control activities will be conducted under this target.

Milestones

- By 2026, legal and policy measures that improve access to genetic resources revised and capacity building to manage genetic resources to relevant stakeholders delivered;
- By 2028, bioprospecting on selected genetic resources conducted and involved local communities in management and benefit-sharing;
- By 2028, market linkages created/strengthened and value addition promoted for at least 18 selected commodities;

- By 2029, monitoring and evaluation scheme for the accessed genetic materials strengthened;
- By 2029, international and local partnerships to facilitate and expand access to genetic materials fostered;
- By 2030, access to genetic resources for research and development of accessions of crop and horticulture and of forest and rangeland plants, straws of semen of domestic animals, accessions of microbial species/strains and access permits are increased by 32%, 18%, 67%, 17% and 55%, respectively.

Eth - Target 13: By 2028, biodiversity and ecosystem services related laws, including those associated with incentives are studied, reviewed and integrated into the national and local development policies, strategies and plans.

Technical rationale

Perverse incentives, a lack of regulations in certain sectors of biodiversity, and limited harmonization of laws, rules, and policies have all contributed to the loss of biodiversity. As a result, existing laws, rules, and strategies must be reviewed, any gaps must be filled, and new ones need to be created. Additionally, in order to enforce the existing laws and regulations, capacity development is required.

Implementation strategy

Finding and addressing the gaps in the existing laws, regulations, and strategies, including those associated with incentives, will be the foundation of the strategy for achieving this target. One of the biggest issues for implementing this target is the requirement to harmonize the Nagoya Protocol with the ABS proclamation and regulations. Additionally, it is necessary to promote the positive incentives and lessens or remove the perverse ones. Another vital component of the plan for achieving this target is the mainstreaming of the updated and/or newly formulated laws, rules, and policies.

Milestones

- By 2027, existing biodiversity and ecosystem services related laws reviewed, the negative and positive incentives identified and appropriate corrective measures made and laws updated;
- By 2028, guidelines for mainstreaming biodiversity and ecosystem services considerations into national and local development policies, strategies, and plans developed, capacity built and mainstreamed; and
- By 2029, incentive schemes that encourage biodiversity-friendly practices and discourage harmful incentives developed and implemented.

Eth - Target 14: By 2030, a system of regulation and guidelines formulated, integrated to tax and business laws and enforced to implement biodiversity compliance to offset negative impacts of business activities on biodiversity.

Technical rationale

Businesses affect biodiversity in both positive and harmful ways. Businesses that embrace sustainable practices and invest in conservation can help alleviate these negative impacts and even encourage biodiversity conservation. However, those which are unsustainable activities, such as deforestation, pollution, and habitat destruction, can seriously damage ecosystems and limit biodiversity. Recently, businesses are progressively being urged to address their biodiversity impact because of public scrutiny. Thus, in order to progressively reduce negative impacts on biodiversity, increase positive impacts, business and financial institutions need to reduce biodiversity-related risks, and promote actions to ensure sustainable patterns of production.

Implementation strategy

In order to reduce the negative impacts of businesses and companies on biodiversity, urgent actions are needed. These include implementing administrative, legal, and policy measures to support and facilitate business, especially to make sure that large and transnational

corporations and financial institutions: (a) Continually monitor, evaluate, and openly report their risks, dependencies, and impacts on biodiversity, including requirements for all large and transnational corporations and financial institutions along their supply and value chains, operations, and portfolios; (b) Give consumers the information they need to support sustainable consumption patterns; (c) Report on compliance with applicable access and benefit-sharing regulations and measures.

Milestones

- By 2027, regulations and guidelines on biodiversity and ecosystem services formulated and integrated into tax and business laws;
- By 2027, a system of Biodiversity Impact Assessments for investment projects established and implemented;
- By 2028, a system of tax incentives for investments in favor of biodiversity and enforce penalties deterring damage biodiversity implemented; and
- By 2029, a certification schemes for products and businesses that foster the perpetuation of biodiversity enhanced.

Eth - Target 15: By 2028, biodiversity priorities and concerns are integrated into biosafety regulatory framework and capacity to regulate transaction of GMOs is enhanced.

Technical rationale

The Federal Democratic Republic of Ethiopia's Constitution's Articles 44 and 92 guarantee environmental rights, which include safeguarding the health of people and animals, the environment, and the nation's overall socioeconomic circumstances against potential threats posed by modified organisms. Following the constitutions, the proclamation aims to prevent or at least manage the negative impacts of modified organisms to negligible levels legislated in order to safeguard biological diversity, human and animal health, the environment, local communities, and the entire nation. Therefore, there is a need to integrate biodiversity priorities and concerns into biosafety regulatory framework and enhance capacity to regulate transaction of GMOs.

Implementation strategy

The strategy intends to create, bolster, and execute biosafety protocols as outlined in Article 8(g) of the Convention on Biological Diversity and biotechnology handling and benefit distribution protocols as outlined in Article 19 of the Convention. The strategy will be implemented through enhancing institutional capacity and collaboration among stakeholders, and developing regulatory and monitoring and evaluation schemes.

Milestones

- By 2026, institutional capacity and collaboration on educating biosafety regulations and potential impacts of GMOs on biodiversity to the public enhanced;
- By 2027, studies on the long-term ecological effects of GMOs and potential mitigation strategies conducted;
- By 2027, the regulatory framework to address potential impacts of GMOs on ecosystems and species ensured;
- By 2028, tools for monitoring and evaluating the actual and potential risks GMOs pose on biodiversity, environment and health developed; and
- By 2028, biotechnology regulatory frameworks vis-a-vis safe use, transport, and release of GMOs updated.

Eth - Target 16: By 2030, capacity to implement biodiversity conservation, sustainable utilization and access and benefit sharing are improved by strengthening information technology, gene banks and laboratory infrastructures through technology transfer, and scientific and technical cooperation; including through South-South and North-South cooperation.

Technical rationale

Information technology (IT), gene banks, and laboratory infrastructure play crucial roles in biodiversity conservation, sustainable use, and Access and Benefit-Sharing (ABS) through enabling data collection, storage, analysis, and genetic resource management,

while also supporting research and development for sustainable practices. However, there is a serious lack of those infrastructural capacities at national level that are commensurate with the huge biodiversity resources the country harbors. High-level infrastructure capacity is crucial for biodiversity conservation because it enables effective planning, management, and protection of natural ecosystems. This includes robust systems for data collection, analysis, and monitoring, as well as the ability to implement and enforce conservation policies and regulations. Without adequate information technology, gene banks and laboratory infrastructure, efforts to mitigate the negative impacts of development on biodiversity are often hampered, leading to habitat loss, fragmentation, and ultimately, loss of species.

Implementation strategy

Building capacity is essential to achieving the requirements for the successful execution of all the targets outlined in this strategy, particularly in Ethiopia, where institutional capacity in the areas of information technology, gene banks, and laboratory infrastructures is limited. To address this, efforts must focus on enhancing innovation, improving access to and transfer of technology, and expanding capacity-building and technical cooperation, particularly through North-South and South-South partnerships. Moreover, collaborative scientific research and technology development programs should be promoted to support the conservation and sustainable use of biodiversity, while strengthening national scientific research and monitoring capacities in alignment with the strategy's ambitious goals.

Milestones

- By 2026, the existing and required infrastructure information technology, gene banks and laboratory identified;
- By 2027, gene banks, and laboratories with required infrastructure established/strengthened;
- By 2027, technology transfer through partnerships, funding, and capacity-building initiatives, scientific & technical cooperation-South-South and South-North cooperation enhanced;
- By 2028, digital sequence information database established and organized;

- By 2029, develop and implement informed digital decision support tools such as barcoding, AI, remote sensing, GIS, and drones to support biodiversity conservation, sustainable use, and equitable access and benefit-sharing; and
- By 2030, metrics and indicators to assess the effectiveness of capacity-building initiatives in biodiversity conservation developed.

Eth - Target 17: By 2030, data, information and comprehensive knowledge and innovations related to biodiversity values, ecosystem functioning, status and trends are generated, and the consequences of biodiversity loss are determined, reviewed, compiled and made accessible to decision makers, practitioners and the public, and are applied in biodiversity related planning and decision-making processes.

Technical rationale

There is a significant lack of comprehensive data and information on the values, functions, status, and trends of Ethiopia's biodiversity as well as the impacts of its loss. To address this gap, it is essential to generate new knowledge and compile existing data to identify key threats and set informed priorities for biodiversity conservation and sustainable use. Achieving this target will stimulate new research, drive technological innovation, and strengthen biodiversity monitoring, contributing directly to the success of other targets within the Strategy. Moreover, improved access to accurate information will enhance the integration of science and policy, supporting the broader goals of the Strategic Plan.

Implementation strategy

Implementation of this target will require generation and compilation of biodiversity related knowledge and information on the values of biodiversity and ecosystem services, functioning, status and trends, and the consequences of loss of biodiversity. This also requires more investment in research, including modeling and participatory research approaches. Improvements are also needed in the policy development, based on scientific research. In order to support effective and equitable governance, integrated and participatory management of biodiversity, and improve communication, awareness-

raising, education, monitoring, research and knowledge management, it is important to make sure that the best up-to-date data, information, and knowledge are available to decision makers, practitioners and the general public. Additionally, traditional knowledge, innovations, practices and technologies of indigenous peoples and local communities should only be accessed with their free, prior and informed consent, in compliance with national legislation. To achieve this, a coordinated national knowledge management system should be established, integrating scientific, traditional, and policy-relevant information to guide decision-making and promote inclusive biodiversity governance.

Milestones

- By 2029, research on biodiversity status, trends, threats, traditional knowledge, and ABS, and national baseline data on biodiversity and ecosystem services compiled and available for use;
- By 2026, monitoring programs to track biodiversity values, ecosystem functions, and trends, and developed centralized biodiversity databases established;
- By 2026 National Report on biodiversity status, trends, and the consequences of biodiversity loss prepared;
- By 2030, application of emerging technologies such as Digital Sequence Information (DSI), DNA barcoding, artificial intelligence (AI), remote sensing, GIS, and drones in biodiversity conservation, sustainable use, and ABS-related research improved;
- By 2030, knowledge, and innovation for further research, and development generated and applied;
- By 2027, valuation studies on selected species/varieties strains/breeds/wetlands, rangeland and forest ecosystems conducted;
- By 2030, decision support tools and resources for communication to policymakers, scientific community and practitioners developed.

Eth - Target 18: By 2030, gender equality and a gender-responsive approach for

biodiversity actions are ensured through awareness, participation, and social inclusion of disability, youth, children, and other vulnerable groups, and the actions that the stakeholders can take to conserve and use biodiversity sustainably are improved.

Technical rationale

Under the 2030 Agenda for Sustainable Development, the Ethiopian government has committed to ensuring gender equality and social inclusion. However, gender inequality continues to hinder women's access to and control over biodiversity resources. A major challenge is the lack of baseline data on women's involvement in biodiversity, and the absence of a well-established institutional framework to implement inclusive biodiversity policies. Women and other vulnerable groups are often excluded from decision-making processes in the planning, implementation, monitoring, evaluation, and research of biodiversity conservation and management. Yet, biodiversity conservation cannot be effectively achieved without the active participation of all segments of society. Women, in particular, play a vital role in conserving and sustaining biodiversity, but are often discouraged by unequal rights on access to and control over biodiversity resources and ecosystem services including limited control over income generated from biodiversity-related activities. Furthermore, there is weak implementation of existing guidelines designed to mainstream gender into biodiversity conservation and management efforts.

Implementation strategy

To ensure full implementation of this target, equitable, inclusive, effective and gender-responsive representation and participation in decision-making, and access to justice and information related to biodiversity has paramount importance to use biodiversity in a sustainable manner. It is vital to support the full participation of indigenous peoples and local communities, respecting their cultures and rights over lands, territories, resources, and traditional knowledge. Equally important is the meaningful inclusion of women and

girls, children and youth, and persons with disabilities in all aspects of biodiversity conservation and management.

Recognizing and supporting gender integration, specially focusing on women and their contributions to sustainable resource conservation and the use of indigenous systems for biodiversity conservation are key activities to achieving this target. The establishment and strengthening of networks to promote gender mainstreaming within biodiversity conservation and management will be prioritized. Moreover, promoting gender awareness and active involvement in all biodiversity programs and projects is essential. The development of clear guidelines and regulations will also play a critical role in the effective implementation of this target.

Milestones

- By 2026, baseline data on the level of awareness, participation and social inclusion of disability, youth and children on biodiversity related actions generated;
- By 2026, capacity of relevant sectors on gender and social inclusion in decision making process built and general guideline to monitoring and ensure gender and social inclusion in biodiversity conservation developed;
- By 2028, the level of women's access to and control over biodiversity resources, awareness and social inclusion monitored and evaluated and gender-biodiversity nexus into school curricula at all levels integrated; and
- By 2028, awareness campaigns and highlight the importance of gender equality in biodiversity conservation conducted and participation of women and vulnerable groups in the planning implementation and evaluation of biodiversity actions ensured.

Eth - Target 19: By 2029, mobilization of financial resources from domestic sources required for effective implementation of the strategy by mandated sectoral institutions is increased at least by 57% and strategy is devised to secure additional funds from other internal and external sources.

Technical rationale

One of the major obstacles for the implementation of the previous NBSAP was the limited availability of financial resources. The Government of Ethiopia is strongly committed to supporting biodiversity conservation and sustainable use efforts. However, given the numerous challenges facing biodiversity and ecosystems, government funding alone is insufficient to fully implement the current Strategic Plan. Effective implementation of the current NBSAP (2025-2030) requires full support and cooperation of the stakeholders. Moreover, it requires substantial financing both from national and international sources. Therefore, the focal institute should develop financial resources mobilization strategy, and therefore, mobilization of substantial amount of internal and external funds is critically required to effectively implement the Strategic Plan.

Implementation strategy

In order to implement national biodiversity strategies and action plans, it is necessary to significantly and progressively increase the amount of financial resources from all sources: domestic, international, public, and private in an efficient, timely, and easily accessible manner. This endeavor will mobilize at least 557,897,042 USD until 2030, through:

- Increasing total biodiversity related international financial resources;
- Significantly increasing domestic resource mobilization, facilitated by the preparation and implementation of national biodiversity financial mobilization plan;
- Leveraging private finance, promoting blended finance, implementing strategies for raising new and additional resources, and encouraging the private sector to invest in biodiversity;

- Stimulating innovative schemes such as payment for ecosystem services, green bonds, biodiversity offsets and credits, and benefit-sharing mechanisms, with environmental and social safeguards;
- Enhancing the role of collective actions, including by indigenous peoples and local communities, and non-market-based approaches including community based natural resource management and civil society cooperation and solidarity aimed at the conservation of biodiversity; and
- Enhancing the effectiveness, efficiency and transparency of resource use.

Milestones

- By 2026, a resource mobilization strategy and allocation guideline is developed, and a comprehensive review of current domestic financial resources for biodiversity is conducted to inform and guide implementation actions;
- By 2026, adequate budget allocations made for biodiversity conservation actions;
- By 2027, sectoral institutions trained in financial management and resource mobilization techniques to support biodiversity conservation;
- By 2027, biodiversity funding is prioritized and included in national development plans ensured through engaging with decision makers;
- By 2028, media, civil societies, and professional societies and celebrities to foster support for enhanced funding promoted;
- By 2029, national biodiversity fund (green fund, PES, offsets) to finance the Strategy initiated;
- By 2029, external funding from international trustees and development partners mobilized and the status of utilization of the solicited budget monitored and evaluated; and
- By 2030, fiscal allocation for biodiversity actions increased by at least by 57%.

Ethiopia's Updated National Biodiversity Strategy and Action Plan 2025-2030

Table 11: Goals, targets, actions, implementing agencies and period of implementation

GBF Goal A: Ecosystems are conserved, extinctions are halted and genetic diversity is maintained						
Targets	Indicators	Actions	Implementing Agencies		Impl. Period	Cost of Implementation (USD)*
			Leads ^{1a}	Collaborators ^{2a}		
Eth -Target 1: By 2030, areas of biodiversity importance are spatially planned, effectively managed and increased from the existing 30% to 80%, addressing land-use changes with full participation of stakeholders	Headline Indicators <ul style="list-style-type: none"> • 1.1 Percentage of land and sea area covered by biodiversity-inclusive spatial plans • A.1 Red List of Ecosystems • A.2 Extent of natural ecosystems • A.3 Red List Index • A.4 The proportion of populations within species with an effective population size > 500 	1.1. Verify the current extent of areas under spatial plan	SSGI	EWCA, EFD, MoA, MoPD, ESS, PSI, HLIs	2025-2026	124,747
		1.2. Identify additional key biodiversity areas and conduct study on their conservation status	EBI	SSGI, EWCA, EFD, MoA, MoPD, PSI, HLIs	2025-2026	12,916
		1.3. Set priority to spatial plan from the identified high biodiversity areas	EBI	SSGI, EWCA, EFD, MoA, MoPD	2025-2026	124,747
		1.4. Identify capacity gaps related to spatial planning and provide capacity building support	SSGI	EBI, EWCA, EFD, MoA, MoPD	2025-2026	24,508

¹ **Lead agency:** The institute mandated to carryout actions stated under the respective targets of this NBSAP. It is the agency that takes major responsibility to execute the actions and coordinate others

² **Collaborating agency:** The institute that works in close coordination with lead agency to execute the specified actions, as per condition set under binding instrument (to be prepared as separate document)

a- some of the acronyms standing for lead and collaborating agencies are defined at the end of this Table (Table 11)

*. Year by year cost of implementation for each target is indicated in Annex VIII.

Ethiopia's Updated National Biodiversity Strategy and Action Plan 2025-2030

Targets	Indicators	Actions	Implementing Agencies		Impl. Period	Cost of Implementation (USD)*
			Leads ^{1a}	Collaborators ^{2a}		
	National Indicator <ul style="list-style-type: none"> Percentage of key biodiversity areas put under spatial plan 	1.5. Increase the total area under spatial planned high-biodiversity areas to 80%	SSGI	EBI, EWCA, EFD, MoA, MoPD	2025-2030	2,483,909
		1.6. Put in place certification system for the spatially planned areas	MoA	EBI, EWCA, EFD, SSGI, MoPD,	2025-2028	14,903
Target 1: Estimated total implementation cost (million USD)						2,785,732
Eth - Target 2: By 2030, forest coverage is increased from 23.6% to 30%, area of degraded wetland decreased by 20% from the existing 27,142.5 km ² and degraded terrestrial land decreased by 20% from the existing 85,243 km ² , extent of conversion of grazing land decreased from	Headline Indicators <ul style="list-style-type: none"> 12.1 Average share of the built-up area of cities that is green/blue space for public use for all Component indicators <ul style="list-style-type: none"> Recreation and cultural ecosystem services provided 	2.1. Undertake the assessment to identify priority forest restoration areas and conduct afforestation and reforestation on the areas and increase forest cover to 30%	EFD	EBI, MoWE, MoA, MoIL, EWCA, SSGI, HLIs, NGOs	2025-2030	55,299,920
		2.2. Undertake the assessment to identify priority watershed restoration areas and conduct restoration on the areas and decrease their degradation by 20% from the current status	MoA	EBI, MoWE, MoIL, EWCA, HLIs, NGOs	2025-2030	55,314,879
		2.3. Undertake the assessment to identify priority wetland restoration areas and conduct restoration on the	MoWE	EBI, MoA, MoIL, EWCA, HLIs, NGOs	2025-2030	55,223,269

Ethiopia's Updated National Biodiversity Strategy and Action Plan 2025-2030

Targets	Indicators	Actions	Implementing Agencies		Impl. Period	Cost of Implementation (USD)*
			Leads ^{1a}	Collaborators ^{2a}		
43.7% to 30% through fostering ecosystem-based management approach, thereby ensuring at least 30% of the degraded land is restored.		areas and decrease their degradation by 20% from the current status				
		2.4. Undertake the assessment to identify priority restoration rangeland areas and conduct restoration on the areas and decrease their degradation by 30% from the current status	MoIL	EBI, MoA, EWCA, HLIs, NGOs	2025-2030	55,287,338
		2.5. Increase alternative livelihood options, reduce dependence on subsistence agriculture, and enhance efficient alternative energy options	MoA	EBI, MoWE, MoIL, EWCA, EPA, EFD, HLIs, NGOs	2025-2030	55,813,045
		2.6. Put in place legal frameworks and tools that promote the restoration of forest lands, wetlands, grazing lands and other ecosystems; and also ensure the enforcement of those in the existence	MoA	EBI, MoWE, MoIL, EWCA, PSI, EFD, HLIs, NGOs	2025-2030	55,542,205
Target 2: Estimated total implementation cost (million USD)						332,480,656

Ethiopia's Updated National Biodiversity Strategy and Action Plan 2025-2030

Targets	Indicators	Actions	Implementing Agencies		Impl. Period	Cost of Implementation (USD)*
			Leads ^{1a}	Collaborators ^{2a}		
Eth - Target 3: By 2030, ecologically representative protected areas including biosphere reserves and inland waters are increased from 12 to 30%, while the existing 0.08% ecosystem and species-based <i>in situ</i> sites are doubled through enhancing their ecological connectivity and effective management by actively engaging local communities	Headline indicators <ul style="list-style-type: none"> • Coverage of protected areas and other effective area-based conservation measures • A.1 Red List of Ecosystems • A.2 Extent of natural ecosystems • A.3 Red List Index • A.4 The proportion of populations within species with an effective population size > 500 Other National Indicators <ul style="list-style-type: none"> • IUCN green list of protected and 	3.1. Identify gaps in the level of representativeness, integrity and connectivity of the existing PAs, and update demarcation of the existing PAs and enhance their connectivity	EWCA	EBI, EFD, MoA, MoWE, MoIL, EPA, HLIs, NGOs	2025-2030	114,977
		3.2. Establish new PAs to increase their coverage to 30%	EWCA	EBI, EFD, MoA, MoWE, MoIL, EPA, HLIs, NGOs	2025-2027	15,114,260
		3.3. Revise and develop an effective management plan for the existing and newly established PAs	EWCA	EBI, EFD, MoA, MoWE, MoIL, EPA, HLIs, NGOs	2025-2028	6,027,620
		3.4. Identify gaps in the existing ecosystem and species-based <i>in situ</i> sites, and double the ecosystem and species-based <i>in situ</i> conservation areas	EBI/EWCA	EBI, EFD, MoA, MoWE, MoIL, EPA, HLIs, NGOs	2025-2030	80,727
		3.5. Enhance livelihoods of local communities around PAs	EWCA	EBI, EFD, MoA, MoWE, EPA, HLIs, NGOs	2025-2030	2,764,039

Ethiopia's Updated National Biodiversity Strategy and Action Plan 2025-2030

Targets	Indicators	Actions	Implementing Agencies		Impl. Period	Cost of Implementation (USD)*
			Leads ^{1a}	Collaborators ^{2a}		
	conserved areas <ul style="list-style-type: none"> Number of hectares of UNESCO designated sites (biosphere reserves) 	3.6. Manage and minimize human-wildlife conflict through active participation of local communities and other stakeholders	EWCA	EBI, EFD, MoA, MoWE, EPA, HLIs, NGOs	2025-2030	5,247,373
		3.7. Enhance livelihoods of local communities around ecosystem, and species-based <i>in situ</i> sites, and biosphere reserves	EBI/EWCA	EBI, EFD, MoA, MoWE, EPA, HLIs, NGOs	2025-2030	5,551,980
Target 3: Estimated total implementation cost (million USD)						34,898,976
Eth - Target 4: By 2030, <i>in situ</i> conservation of agrobiodiversity is increased from 178 to 205 sites for conservation of crop varieties and animal breeds on farm, and management standards	Headline Indicators <ul style="list-style-type: none"> Coverage of protected areas and other effective area-based conservation measures A.1 Red List of Ecosystems A.2 Extent of natural ecosystems A.3 Red List Index 	4.1. Determine the proportion of the existing <i>in situ</i> agrobiodiversity conservation sites relative to the total agricultural land; set priorities for the conservation of crop varieties and domestic animal breeds	EBI	MoA, EIAR, HLIs, NGOs	2025-2026	50,451
		4.2. Enhance community-led seed banks and breed associations and establish new ones, and increase the number of the representative sites to 94	EBI	MoA, EIAR, HLIs, NGOs	2025-2030	48,022

Ethiopia's Updated National Biodiversity Strategy and Action Plan 2025-2030

Targets	Indicators	Actions	Implementing Agencies		Impl. Period	Cost of Implementation (USD)*
			Leads ^{1a}	Collaborators ^{2a}		
of the existing are improved	<ul style="list-style-type: none"> A.4 The proportion of populations within species with an effective population size > 500 <p>Other National Indicators</p> <ul style="list-style-type: none"> Number of crop varieties conservation sites es Number of animal breeds conservation sites es 	4.3. Raise awareness and capacitate local communities, extension agents and other stakeholders	EBI	MoA, EIAR, HLIs, NGOs, Media	2025-2030	670,655
		4.4. Improve management standards of the <i>in situ</i> sites	EBI	MoA, EIAR, HLIs, NGOs	2025-2027	29,807
		4.5. Conduct participatory monitoring and evaluation	EBI	MoA, EIAR, HLIs, NGOs	2025-2030	128,059
Target 4: Estimated total implementation cost (million USD)						926,995
Eth - Target 5: By 2030, <i>ex situ</i> conservation; emphasizing endemic, endangered, economically and ecologically important species of crop varieties	<p>Headline Indicators</p> <ul style="list-style-type: none"> Coverage of protected areas and other effective area-based conservation measures 	5.1. Evaluate current <i>ex situ</i> conservation status of crop varieties, forest species, animal breeds and microbial strains	EBI	MoA, EIAR, HLIs, NGOs	2025-2026	22,355
		5.2. Identify priority species, varieties, strains, or breeds that are endemic, endangered, economically or ecologically important	EBI	MoA, EIAR, HLIs, NGOs	2025-2026	251,151

Ethiopia's Updated National Biodiversity Strategy and Action Plan 2025-2030

Targets	Indicators	Actions	Implementing Agencies		Impl. Period	Cost of Implementation (USD)*
			Leads ^{1a}	Collaborators ^{2a}		
of 92,258 accessions, 3,644 accessions of forest and rangeland plant species, 120,000 straws of animal breeds and 1,350 microbial species/strains are increased by 10%, 25%, 50%, and 10%, respectively; and standards of the existing <i>ex situ</i> conservation are improved.	<ul style="list-style-type: none"> • A.1 Red List of Ecosystems • A.2 Extent of natural ecosystems • A.3 Red List Index • The proportion of populations within species with an effective population size > 500 	5.3. Increase the <i>ex situ</i> conservation of crop varieties and forest species accessions, straws of semen and strains of microbes by 10%, 25%, 50%, and 10%, respectively	EBI	MoA, EIAR, HLIs, NGOs	2025-2030	529,901
		5.4. Improve management standards of the <i>ex situ</i> sites	EBI	MoA, EIAR, HLIs, NGOs	2025-2028	11,040
		5.5. Establish field gene banks, animal gene bank and botanical gardens	EBI	MoA, EIAR, HLIs, NGOs	2025-2030	386,386
		5.6. Enhance partnerships with <i>ex situ</i> collection holders and development partners	EBI	MoA, EIAR, HLIs, NGOs	2025-2030	55,750
		5.7. Conduct participatory monitoring and evaluation	EBI	MoA, EIAR, HLIs, NGOs	2025-2030	48,298
Target 5: Estimated total implementation cost (million USD)						1,304,880
Eth - Target 6. By 2030, proportion of areas invaded by invasive alien species reduced by	Headline indicators	6.1. Carry-out a study on status, trends and impacts of major invasive alien species, and map their distribution	EPA	EBI, MoWE, EWCA, EFD, MoA, MoIL, PSI, EIAR, SSGI, HLIs, NGOs	2025-2026	48,298

Ethiopia's Updated National Biodiversity Strategy and Action Plan 2025-2030

Targets	Indicators	Actions	Implementing Agencies		Impl. Period	Cost of Implementation (USD)*
			Leads ^{1a}	Collaborators ^{2a}		
50% from the existing 3,949,314 ha through eradicating the existing invasions and preventing their introduction and expansion.	<ul style="list-style-type: none"> • Rate of invasive alien species establishment • A.1 Red List of Ecosystems • A.2 Extent of natural ecosystems • A.3 Red List Index • A.4 The proportion of populations within species with an effective population size > 500 	6.2. Update the existing strategy on invasive alien species	EPA	EBI, MoWE, EWCA, EFD, MoA, MoIL, EIAR, HLIs, NGOs	2025	40,899
		6.3. Put in place and implement measures to regulate and monitor the invasive alien species, including newly emerging ones	EPA	EBI, MoWE, EWCA, EFD, MoA, MoIL, EIAR, HLIs, NGOs	2025-2030	95,607
		6.4. Undertake invasive alien species control and eradication measures and reduce their coverage to 50% by dedicating special emphasis on the six major invasive alien species (Prosopis, Parthenium weed, Water hyacinth, Lantana weed, Cochineal insect and Striga.)	EPA	EBI, MoWE, EWCA, EFD, MoA, MoE, MoIL, EIAR, MoE, HLIs, NGOs	2025-2030	63,401,783
		6.5. Enhance entry point inspection and control measures towards early detection and prevention of new introductions	EPA	EBI, MoWE, EWCA, EFD, MoA, MoIL, EIAR, HLIs, NGOs	2025-2030	68,997

Ethiopia's Updated National Biodiversity Strategy and Action Plan 2025-2030

Targets	Indicators	Actions	Implementing Agencies		Impl. Period	Cost of Implementation (USD)*
			Leads ^{1a}	Collaborators ^{2a}		
		6.6. Encourage development and adoption of innovative technologies and appropriate approaches for managing invasive alien species	EPA	EBI, MoWE, EWCA, EFD, MoA, MoIL, EIAR, HLIs, NGOs	2025-2030	551,980
		6.7. Monitor and evaluate the success of eradication efforts and adjust control measures on IAS	EPA	EBI, MoWE, EWCA, EFD, MoA, MoIL, EIAR, HLIs, NGOs	2025-2030	151,794
Target 6: Estimated total implementation cost (million USD)						64,359,358
Eth - Target 7: By 2030, pollution of major ecosystems is reduced by at least 10% from the existing 10 million tones by application of innovative measures, with emphasis on municipal and industrial sources.	Headline Indicators <ul style="list-style-type: none"> • Index of coastal eutrophication potential • 7.2 Pesticide environment concentration • A.1 Red List of Ecosystems • A.2 Extent of natural ecosystems • A.3 Red List Index 	7.1. Identify major ecosystems affected by pollution and the major pollutants	EPA	EBI, EWCA, MoWE, MoA, MoPD, MoI, MoM, MoUI, HLIs, NGOs	2025	55,198
		7.2. Reduce pollution caused by pollutants from urban centers, industrial and agricultural sectors by 10%	EPA	EBI, EWCA, MoWE, MoA, MoI, MoE, MoUI, EFD, HLIs, NGOs	2025-2030	91,629
		7.3. Encourage development and adoption of innovative technologies and approaches for managing pollution, including those that promote the reduction, reusing,	EPA	EBI, EWCA, MoWE, MoA, MoI, MInT, HLIs, NGOs	2025-2030	386,386

Ethiopia's Updated National Biodiversity Strategy and Action Plan 2025-2030

Targets	Indicators	Actions	Implementing Agencies		Impl. Period	Cost of Implementation (USD)*
			Leads ^{1a}	Collaborators ^{2a}		
	<ul style="list-style-type: none"> A.4 The proportion of populations within species with an effective population size > 500 	recycling and safe disposal of consumable items				
		7.4. Update regulations and standards of pollution control and enhance their enforcement	EPA	EBI, EWCA, MoWE, MoA, MoTL, MI nT PSI, MoJ, HLIs, NGOs	2025-2026	33,119
		7.5. Aware the public and private sector regarding the impact of pollution on biodiversity, ecosystem services and business sector	EPA	EBI, EWCA, MoWE, MoA, MoE, MoI, MoUI, MoH, Media, HLIs, NGOs	2025-2030	275,990
Target 7: Estimated total implementation cost (million USD)						842,321
Eth - Target 8: By 2030, land-based mitigation and adaptation measures contribute to the reduction of at least 152.75 MtCO ₂ e from	Headline Indicators <ul style="list-style-type: none"> Red List of Ecosystems A.2 Extent of natural ecosystems A.3 Red List Index 	8.1. Ensure inter-sectoral coordination and reduce a total of 50.3 MtCO ₂ e GHG emission of the BAU scenario of 346 MtCO ₂ e from agriculture, forestry and other land use forms	MoPD	MoA, EBI, EFD, EWCA, MoWE, EPA, MoIL, ESS, SSA, MoI, MoUI HLIs, NGOs	2025-2030	82,797
		8.2. Enhance nature positive and climate smart practices in forestry	EFD	MoPD, MoA, EBI, EWCA, MoWE, EPA,	2025-2026	800,371

Ethiopia's Updated National Biodiversity Strategy and Action Plan 2025-2030

Targets	Indicators	Actions	Implementing Agencies		Impl. Period	Cost of Implementation (USD)*
			Leads ^{1a}	Collaborators ^{2a}		
the BAU scenario of 346 MtCO ₂ e, and inter-sectoral coordination towards biodiversity mainstreaming in the climate actions is increased.	<ul style="list-style-type: none"> A.4 The proportion of populations within species with an effective population size >500 			MoIL, MoWSA, HLIs, NGOs, Media		
		8.3. Engage local communities in conservation and land management efforts, and provide support for community-led initiatives	EFD	MoPD, MoA, EBI, EWCA, MoWE, EPA, MoIL, HLIs, NGOs	2025-2030	303,589
		8.4. Enhance nature positive and climate smart practices in livestock and crop production	MoA	MoPD, EFD, EBI, EWCA, MoWE, MoE, EPA, MoIL, EMDIDI, EHPEA, EPOSPEA, MoTRI, HLIs, NGOs	2025-2026	800,371
		8.5. Enhance the management of grazing lands in the highlands and rangelands in pastoral/agro-pastoral areas, including promotion of rotational grazing	MoA	MoPD, EFD, EBI, EWCA, MoWE, EPA, MoIL, HLIs, NGOs	2025-2030	303,589
		8.6. Implement measures that enhance soil and water conservation	MoA	MoPD, EFD, EBI, EWCA, MoWE, EPA, HLIs, NGOs	2025-2030	800,371
		8.7. Enhance nature positive and climate smart practices in industry	MoI	MoPD, MoA, EFD, EBI, EWCA, MoWE,	2025-2026	303,589

Ethiopia's Updated National Biodiversity Strategy and Action Plan 2025-2030

Targets	Indicators	Actions	Implementing Agencies		Impl. Period	Cost of Implementation (USD)*
			Leads ^{1a}	Collaborators ^{2a}		
				EPA, MoIL, MInT, HLIs, NGOs		
		8.8. Enhance efficient alternative energy options	MoWE	MoPD, MoA, EBI, EWCA, EPA, MoIL, MoI, EFD, EIH, HLIs, NGOs	2025-2026	303,589
Target 8: Estimated total implementation cost (million USD)						3,698,265
GBF Goal B: Biodiversity is sustainably used and its contribution to people are maintained, enhanced or restored						
Eth - Target 9: By 2030, unsustainable utilization of wild genetic resources is reduced ensuring that all uses, including harvesting and trading activities are implemented sustainably, safely and legally.	Headline Indicators <ul style="list-style-type: none"> Proportion of fish stocks within biologically sustainable levels 9.1 Benefits from the sustainable use of wild species 9.2 Percentage of the population in traditional occupations 	9.1. Undertake assessments on unsustainable utilization of wild genetic resources	EWCA	EBI, EFD, MoA, EPA, MoTRI, MoR, HLIs, Ethiopian Controlled Hunting Association	2025-2026	80,727
		9.2. Enhance legal wild genetic resources utilization and market expansion	EWCA	EBI, EFD, MoA, EPA, MoTRI, HLIs, MoR, Ethiopian Controlled Hunting Association, MoT	2025-2028	84,247
		9.3. Enhance the capacity of law enforcement agencies to detect and	EWCA	EBI, EFD, MoA, EPA, MoTRI, Police	2025-2030	55,198

Ethiopia's Updated National Biodiversity Strategy and Action Plan 2025-2030

Targets	Indicators	Actions	Implementing Agencies		Impl. Period	Cost of Implementation (USD)*
			Leads ^{1a}	Collaborators ^{2a}		
	<ul style="list-style-type: none"> A.1 Red List of Ecosystems A.2 Extent of natural ecosystems A.3 Red List Index A.4 The proportion of populations within species with an effective population size > 500 B.1 Services provided by ecosystems 	<p>address illegal and unsustainable activities effectively</p> <p>9.4. Develop sustainable use guidelines for wild genetic resources</p>		<p>Commission, MoJ, Min. of Tourism, Customs Commission, HLIs</p> <p>EBI, EFD, MoA, EPA, MoTRI, HLIs</p>	2025	27,599
Target 9: Estimated total implementation cost (million USD)						247,771
Eth - Target 10: By 2030, biodiversity issues are integrated into agricultural systems through application of biodiversity-friendly	Headline Indicators	10.1. Develop a strategy that promotes agroecological practices	MoA	EIAR, EBI, HLIs, NGOs, ATI	2025-2030	109,292
		10.2. Increase agricultural intensification through biodiversity-friendly practices, and use of improved and innovative technologies	MoA	EIAR, EBI, BETin, ATI, MInT, HLIs, NGOs	2025-2030	59,825,782

Ethiopia's Updated National Biodiversity Strategy and Action Plan 2025-2030

Targets	Indicators	Actions	Implementing Agencies		Impl. Period	Cost of Implementation (USD)*
			Leads ^{1a}	Collaborators ^{2a}		
practices and use of improved decision support processes in agricultural production systems, where at least 25% of agricultural land is put under agro-ecological practices.	<ul style="list-style-type: none"> • 10.2 Progress towards sustainable forest management • B.1 Services provided by ecosystems 	10.3. Develop farmers' capacity towards the adoption and implementation of agroecological practices	MoA	EIAR, EBI, Federal Cooperative Agency, ATI, HLIs, NGOs, Media	2025-2030	310,213
		10.4. Identify and integrate community knowledge, innovation and practices in the process of implementing agroecological principles	MoA	EIAR, EBI, BETin, ATI, Media, HLIs, NGOs	2025-2030	248,391
		10.5. Establish a certification scheme for agro-ecological productions systems and products	MoA	EIAR, EBI, ESS, MoTRI, HLIs, NGOs	2025-2030	317,388
		10.6. Create market linkage for agroecological produces and promote value addition	MoA	EIAR, EBI, MoI, MoTRI, Federal Coop. Agency, Chamber of Commerce, EPOSPEA, EHPEA, HLIs, NGOs	2025-2030	275,990
Target 10: Estimated total implementation cost (million USD)						61,087,056
Eth - Target 11: By 2030, 75 urban centers	Headline Indicator	11.1. Identify and map priority locations for green and blue infrastructures	MoUI	SSGI, EBI, MoPD, EFD	2025-2026	25,703

Ethiopia's Updated National Biodiversity Strategy and Action Plan 2025-2030

Targets	Indicators	Actions	Implementing Agencies		Impl. Period	Cost of Implementation (USD)*
			Leads ^{1a}	Collaborators ^{2a}		
put 30% of their land under spatially planned green areas through biodiversity-inclusive urban planning.	<ul style="list-style-type: none"> 12.1 Average share of the built-up area of cities that is green/blue space for public use for all B.1 Services provided by ecosystems 	11.2. Establish and enhance standards for urban green and blue infrastructures	MoUI	SSGI, EBI, MoPD, MoA, EFD	2025-2026	63,205
		11.3. Mainstream principles of green and blue spatial planning into urban development and foster public-private joint implementation	MoUI	SSGI, EBI, MoA, MoPD, EFD	2025-2030	1,837,900
		11.4. Establish two ecologically representative botanical gardens in the urban settings	EBI	SSGI, EBI, MoPD, MoA, EFD, MoUI	2025-2030	205,000
		11.5. Establish basic urban green and blue development facilities	MoUI	SSGI, EBI, MoPD, MoA, EFD	2028	2,334,909
		11.6. Transform 30% of the land areas of 75 urban centres into spatially planned green and blue areas	MoUI	SSGI, EBI, MoPD, MoA, EFD	2025-2028	807,450
Target 11: Estimated total implementation cost (million USD)						5,274,167
GBF Goal C: Benefits from the use of genetic resources are shared and sustainably increased						
Eth - Target 12: By 2030, access to genetic	Headline Indicators	12.1. Revise legal and policy measures that facilitate/ enhance access to genetic resources	EBI	MoA, MoJ, PSI, MoPD, EWCA, HLIs, EIAR, EAA, NGOs	2025-2026	200,000

Ethiopia's Updated National Biodiversity Strategy and Action Plan 2025-2030

Targets	Indicators	Actions	Implementing Agencies		Impl. Period	Cost of Implementation (USD)*
			Leads ^{1a}	Collaborators ^{2a}		
resources for research and development of 294,616 crop and horticulture accessions, 5700 forest and rangeland plants accessions, 9,000 straws of semen of domestic animals, 620 accessions of microbial species/strains and 1500 access permits are increased by 32%, 18%, 67%, 17% and 55%, respectively and value addition and market linkage are carried-out for at least 18 biological commodities	<ul style="list-style-type: none"> • B.1 Services provided by ecosystems • C.1 Indicator on monetary benefits received • C.2 Indicator on non-monetary benefits 	12.2. Increase from the existing baseline of: <ul style="list-style-type: none"> • 294,616 accessions of crop and horticultural plants by 32% • 5700 accessions of forest and rangeland plants by 18% • 9000 straws of domestic animal semen by 67% • 620 species/strains of microbes by 17% • 1500 access to genetic resources permits by 55% 	EBI	MoA, MoJ, MoE, EWCA, HLIs, EIAR, NGOs	2025-2030	65,000
		12.3. Provide training and resources to relevant stakeholders (e.g., researchers, institutions) to effectively manage and utilize genetic materials	EBI	MoA, MoJ, MoLSA, EWCA, HLIs, EIAR, CSOs/NGOs, Media	2025-2030	63,238
		12.4. Engage local communities in genetic resources management and benefit-sharing undertakings	EBI	MoA, MoJ, EWCA, HLIs, EIAR, NGOs, Media	2025-2030	206,671
		12.5. Conduct bioprospecting on selected species/varieties/strains/breeds	EBI	MoA, BETin, EWCA, HLIs, EIAR, NGOs	2025-2030	216,101

Ethiopia's Updated National Biodiversity Strategy and Action Plan 2025-2030

Targets	Indicators	Actions	Implementing Agencies		Impl. Period	Cost of Implementation (USD)*
			Leads ^{1a}	Collaborators ^{2a}		
		12.6. Strengthen/establish market linkages and promote value addition for at least 18 selected commodities	EBI	MoA, MoJ, MoTRI, MoI, EIC EWCA, HLIs, EIAR, NGOs,	2025-2030	110,096
		12.7. Establish/strengthen monitoring and evaluation scheme for the accessed genetic materials	EBI	MoA, MoJ, MoPD, EWCA, HLIs, EIAR, NGOs	2025-2030	33,101
		12.8. Foster international and local partnerships to facilitate and expand access to genetic materials	EBI	MoFA, MoA, MoJ, MoFA, EWCA, HLIs, EIAR, NGOs	2025-2030	4,140
Target 12: Estimated total implementation cost (million USD)						898,347
Eth - Target 13: By 2028, biodiversity and ecosystem services related laws, including those associated with incentives are studied, reviewed and integrated into the national and	Headline Indicators <ul style="list-style-type: none"> • B.1 Services provided by ecosystems • C.1 Indicator on monetary benefits received 	13.1. Review and update existing biodiversity and ecosystem services related laws	EPA	MoA, MoJ, MoTRI, MoI, MoM, MoPD, EIC	2025-2026	72,199
		13.2. Identify negative and positive incentives of the existing laws on biodiversity and ecosystem services and make corrective measures as appropriate	EPA	MoA, MoJ, MoTRI	2025-2026	33,119

Ethiopia's Updated National Biodiversity Strategy and Action Plan 2025-2030

Targets	Indicators	Actions	Implementing Agencies		Impl. Period	Cost of Implementation (USD)*
			Leads ^{1a}	Collaborators ^{2a}		
local development policies, strategies and plans.	<ul style="list-style-type: none"> C.2 Indicator on non-monetary benefits 	13.3. Develop guidelines for mainstreaming biodiversity and ecosystem services considerations into national and local development policies, strategies, and plans	EPA	MoA, MoJ, MoTRI, MoI, MoPD, MoM, MoWE, EPA, EFD, EIAR, MoI, MoPD, MoM, EIC, MoWE, EPA, EFD, ECA, EWCA, EIAR	2025-2026	47,470
		13.4. Develop and implement incentive schemes that encourage biodiversity-friendly practices and discourage harmful incentives	EBI	MoA, MoJ, MoTRI, MoI, MoPD, MoM, EIC, ECA, EPA, EFD, EWCA	2025-2027	75,069
		13.5. Develop capacity related to mainstreaming biodiversity and ecosystem services into policies and other legal frameworks	EPA	MoA, MoJ, MoTRI, MoI, MoPD, MoM, EPA, EFD, EWCA, EIC, ECA	2025-2030	213,340
		13.6. Mainstream the reviewed and updated laws into national and local development plans	EPA	MoA, MoJ, MoTRI, MoI, MoPD, MoM, EPA, EFD, EWCA, EIC	2025-2028	107,636
Target 13: Estimated total implementation cost (million USD)						548,834

Ethiopia's Updated National Biodiversity Strategy and Action Plan 2025-2030

Targets	Indicators	Actions	Implementing Agencies		Impl. Period	Cost of Implementation (USD)*
			Leads ^{1a}	Collaborators ^{2a}		
Eth - Target 14: By 2030, a system of regulation and guidelines formulated, integrated to tax and business laws and enforced to implement biodiversity compliance to off-set negative impacts of business activities on biodiversity.	Headline Indicators <ul style="list-style-type: none"> • 14.1 Number of companies reporting on disclosures of risks, dependencies and impacts on biodiversity • C.1 Indicator on monetary benefits received • C.2 Indicator on non-monetary benefits 	14.1. Formulate regulations and guidelines on biodiversity and ecosystem services and integrate into tax and business laws	MoR	EBI, MoJ, MoPD, EFD, EPA, EWCA	2025-2028	204,674
		14.2. Establish and implement a system of Biodiversity Impact Assessments for investment projects	EPA	EBI, MoJ, MoPD, EFD, EWCA	2025-2030	89,973
		14.3. Implement a system of tax incentives for investments in favor of biodiversity and enforce penalties deterring damage on biodiversity	MoR	EBI, MoJ, MoPD, EWCA, EFD, EPA	2025-2030	388,594
		14.4. Enhance certification schemes for products and businesses that foster the perpetuation of biodiversity	EPA	EBI, MoJ, MoPD, MoR, MoA, EWCA, EFD	2025-2027	161,730
Target 14: Estimated total implementation cost (million USD)						844,971

Ethiopia's Updated National Biodiversity Strategy and Action Plan 2025-2030

Targets	Indicators	Actions	Implementing Agencies		Impl. Period	Cost of Implementation (USD)*
			Leads ^{1a}	Collaborators ^{2a}		
Eth - Target 15: By 2028, biodiversity priorities and concerns are integrated into biosafety regulatory framework and capacity to regulate transaction of GMOs is enhanced.	Headline indicators <ul style="list-style-type: none"> • C.1 Indicator on monetary benefits received • C.2 Indicator on non-monetary benefits • Other National Indicator • Extent of capacity built to ensure biosafety transactions 	15.1. Enhance institutional capacity and collaboration on biosafety to educate the public about the potential impacts of GMOs on biodiversity and the importance of biosafety regulations	EPA	EBI, MoJ, MoPD, MoR, BETin, EIAR, HLIs, Media	2025-2027	165,594
		15.2. Ensure that the regulatory framework addresses potential impacts of GMOs on ecosystems and species	EPA	EBI, MoJ, MoPD, EIAR, BETin	2025-2030	41,950
		15.3. Develop tools for monitoring and evaluating the actual and potential risks GMOs pose on biodiversity, environment and health	EPA	EPA, MoJ, MoPD, EIAR, BETin	2025-2027	252,476
		15.4. Update biotechnology regulatory frameworks <i>vis-a-vis</i> safe use, transport, and release of GMOs	EPA	EBI, MoJ, MoPD, EIAR, BETin, MoA	2025-2027	35,051
		15.5. Conduct studies on the long-term ecological effects of GMOs and potential mitigation strategies	EBI	EPA, MoJ, MoPD, EIAR, BETin, HLIs	2025-2028	35,548
Target 15: Estimated total implementation cost (million USD)						530,618

Ethiopia's Updated National Biodiversity Strategy and Action Plan 2025-2030

Targets	Indicators	Actions	Implementing Agencies		Impl. Period	Cost of Implementation (USD)*
			Leads ^{1a}	Collaborators ^{2a}		
Eth - Target 16: By 2030, capacity to implement biodiversity conservation, sustainable utilization and access and benefit sharing are improved by strengthening information technology, gene banks and laboratory infrastructures through technology transfer, and scientific and technical cooperation; including through South-South and North-South cooperation.	Headline Indicators	16.1. Identify the existing and the required infrastructure	EBI	MNiT, EIAR, EPA, BETin	2025-2026	39,191
	<ul style="list-style-type: none"> • C.1 Indicator on monetary benefits received 	16.2. Strengthen/establish gene banks, and laboratories with required infrastructure	EBI	BETin, MNiT, EIAR, EPA,	2025-2027	16,315,547
	<ul style="list-style-type: none"> • C.2 Indicator on non-monetary benefits 	16.3. Support technology transfer through partnerships, funding, and capacity-building initiatives, and enhance scientific & technical cooperation-South-South and South-North cooperation	BETin	EBI, MNiT, EIAR, EPA, MoF	2025-2030	8,336,691
	<ul style="list-style-type: none"> • Other National Indicators 	16.4. Establish and organize digital sequence information database	BETin	EBI, MNiT, EIAR, EPA, MoF, MoA, SSGI	2025-2030	8,610,460
	<ul style="list-style-type: none"> • Extent of information technology transfer and strengthened 	16.5. Build infrastructure for informed digital decision support (Barcode, AI, remote sensing, GIS and drones) for conservation of biodiversity, sustainable use and ensuring access and equitable benefit sharing	EBI	MNiT, EIAR, EPA, BETin, MoF, MoA, SSGI	2025-2030	10,997,623

Ethiopia's Updated National Biodiversity Strategy and Action Plan 2025-2030

Targets	Indicators	Actions	Implementing Agencies		Impl. Period	Cost of Implementation (USD)*
			Leads ^{1a}	Collaborators ^{2a}		
		16.6. Develop metrics and indicators to assess the effectiveness of capacity-building initiatives in biodiversity conservation	EBI	EWCA, MoA, EPA	2025-2026	135,235
Target 16: Estimated total implementation cost (million USD)						44,434,746
Eth - Target 17: By 2030, data, information and comprehensive knowledge and innovations related to biodiversity values, ecosystem functioning, status and trends are generated, and the consequences of biodiversity loss are determined, reviewed, compiled and made accessible to decision	Headline Indicators <ul style="list-style-type: none"> • 21.1 Indicator on biodiversity information for monitoring the Kunming-Montreal Global Biodiversity Framework • C.1 Indicator on monetary benefits received 	17.1. Carry out research on status, trends, and threats on biodiversity, and ABS related issues	EBI	EIAR, EWCA, PSI, HLIs	2025-2030	179,504
		17.2. Generate and compile national base line data and information on the status and trends of biodiversity ecosystem services	EBI	EIAR, EWCA, BETin, MNiT, PSI, SSGI, HLIs	2025-2030	-
		17.3. Establish and enhance monitoring programs and track biodiversity values, ecosystem functioning, and trends over time	EBI	EIAR, EWCA, BETin, MNiT, SSGI, EPA, HLIs	2025-2030	576,819
		17.4. Develop centralized databases and compile data on biodiversity	EBI	EIAR, EWCA, MNiT, BETin, PSI, SSGI, EPA, HLIs	2025-2030	-

Ethiopia's Updated National Biodiversity Strategy and Action Plan 2025-2030

Targets	Indicators	Actions	Implementing Agencies		Impl. Period	Cost of Implementation (USD)*
			Leads ^{1a}	Collaborators ^{2a}		
makers, practitioners and the public, and are applied in biodiversity related planning and decision-making processes.	<ul style="list-style-type: none"> C.2 Indicator on non-monetary benefits 	17.5. Prepare National Reports on biodiversity status, trends, and the consequences of biodiversity loss	EBI	EFD, EWCA, HLIs, MoPD, MoA, EPA, SSGI	2025-2030	89,973
		17.6. Apply emerging technologies (DSI, Barcode, AI, remote sensing, GIS and drones) in biodiversity conservation, sustainable use and ABS related research	BETin	EBI, EFD, EWCA, MoA, SSGI, HLIs	2025-2030	99,356
		17.7. Apply generated knowledge, and innovation for further research, and development	EIAR	EBI, EWCA, MNiT, EPA, BeTin, HLIs	2025-2030	73,413
		17.8. Conduct valuation studies on selected species/varieties strains/breeds/wetland/rangeland and forest ecosystems	EBI	EIAR, EWCA, MoA, MoIL, EFD, HLIs	2025-2030	149,145
		17.9. Develop decision support tools and resources for communication to policymakers, scientific community and practitioners	EBI	EWCA, MoJ, MoPD, MoA, NGOs, HILs, Media	2025-2030	60,718
Target 17: Estimated total implementation cost (million USD)						1,228,928

Ethiopia's Updated National Biodiversity Strategy and Action Plan 2025-2030

Targets	Indicators	Actions	Implementing Agencies		Impl. Period	Cost of Implementation (USD)*
			Leads ^{1a}	Collaborators ^{2a}		
Eth - Target 18: By 2030, gender equality and a gender-responsive approach for biodiversity actions are ensured through awareness, participation, and social inclusion of disability, youth, children, and other vulnerable groups, and the actions that the stakeholders can take to conserve and use biodiversity sustainably are improved.	Headline Indicators <ul style="list-style-type: none"> • C.1 Indicator on monetary benefits received • C.2 Indicator on non-monetary benefits 	18.1. Generate baseline data on the level of women's access to and control over biodiversity resources	EBI	MoWSA, HLIs	2025-2026	62,374
		18.2. Generate baseline data on the level of awareness, participation and social inclusion of disability, youth and children on biodiversity related actions	MoWSA	EBI, MoLSA, HLIs, Media	2025-2026	95,493
	Other National Indicator <ul style="list-style-type: none"> • Extent of the national implementation of the gender plan of action 	18.3. Build capacity of relevant sectors on gender and social inclusion in decision making process	MoWSA	EBI, MoLSA, NGOs	22025-2030	125,023
	18.4. Develop general guideline to monitoring and ensure gender and social inclusion in biodiversity conservation	MoWSA	EBI, MoLSA, NGOs	2025-2026	82,797	
	18.5. Monitor and evaluate the level of women's access to and control over biodiversity resources, awareness and social inclusion	EBI	MoWSA, MoLSA, HLIs	2025-2030	82,797	

Ethiopia's Updated National Biodiversity Strategy and Action Plan 2025-2030

Targets	Indicators	Actions	Implementing Agencies		Impl. Period	Cost of Implementation (USD)*
			Leads ^{1a}	Collaborators ^{2a}		
		18.6. Integrate gender-biodiversity nexus into school curricula at all levels	MoE	EBI, MoWSA, HLIs, MoA	2025-2030	55,198
		18.7. Conduct awareness campaigns and highlight the importance of gender equality in biodiversity conservation	EBI	MoWSA, EWCA, EFD, HLIs, Media	2025-2030	137,995
		18.8. Ensure participation of women and vulnerable groups in the planning implementation and evaluation of biodiversity actions	EBI	MoWSA, HLIs	2025-2030	45,262
Target 18: Estimated total implementation cost (million USD)						686,939
GBF Goal D: Biodiversity funding gap of 700 billion USD is closed by ensuring adequate means of implementation are available						
Eth - Target 19: By 2029, mobilization of financial resources from domestic sources required for effective	Headline Indicators • D.1 International public funding, including official development assistance (ODA) for conservation	19.1. Put in place resource mobilization strategy and resource allocation guideline	EBI	MoF, MoPD, EWCA, EFD, EPA, Media, NGOs	2025-2026	51,304
		19.2. Conduct a comprehensive review of current domestic financial resources allocated to biodiversity	EBI	MoF, MoPD, EWCA, EPA, MoA, EFD, NGOs	2025-2026	39,191

Ethiopia's Updated National Biodiversity Strategy and Action Plan 2025-2030

Targets	Indicators	Actions	Implementing Agencies		Impl. Period	Cost of Implementation (USD)*
			Leads ^{1a}	Collaborators ^{2a}		
implementation of the strategy by mandated sectoral institutions is increased at least by 57% and strategy is devised to secure additional funds from other internal and external sources.	and sustainable use of biodiversity and ecosystems • D.2 Domestic public funding on conservation and sustainable use of biodiversity and ecosystems • D.3 Private funding (domestic and international) on conservation and sustainable use of biodiversity and ecosystems Other National Indicators • Amount of public funding mobilized • Amount of private funding mobilized	19.3 Advocate for adequate budget allocations for biodiversity-related projects in sectoral institutions	EBI	MoF, MoPD, EWCA, EPA, MoA, NGOs	2025-2030	14,963
		19.4. Integrate biodiversity considerations into national and regional budget planning processes	MoPD	EBI, MoF, EWCA	2025-2026	51,334
		19.5. Provide training for sectoral institutions on financial management and resource mobilization techniques for biodiversity	MoF	EBI, MoPD, EWCA, NGOs	2025-2026	29,255
		19.6. Increase fiscal allocation for biodiversity actions at least by 57%	MoF	EBI, MoPD	2025-2026	-
		19.7. Engage with decision makers and ensure that biodiversity funding is prioritized in national development plans	EBI	MoF, MoPD, EWCA	2025-2030	-
		19.8. Engage media, civil societies, and professional societies and celebrities to foster support for enhanced funding	EBI	MoF, MoPD, Media, HLI, Philanthropic Organizations	2025-2030	275,990
		19.9. Initiate national biodiversity fund (green fund, PES, offsets) to finance the Strategy	MoPD	EBI, MoF, MoPD, EPA, MoA, EFD, EWCA, NGOs	2025-2030	355,445

Ethiopia's Updated National Biodiversity Strategy and Action Plan 2025-2030

Targets	Indicators	Actions	Implementing Agencies		Impl. Period	Cost of Implementation (USD)*
			Leads ^{1a}	Collaborators ^{2a}		
		19.10 Mobilize external funding from international trustees and development partners	EBI	MoF, MoPD, EWCA, NGOs	2025-2030	-
		19.11 Monitor and evaluate the status of utilization of the solicited budget	EBI	MoF, MoPD, FAA	2025-2030	-
Target 19: Estimated total implementation cost (million USD)						817,482
Estimated grand total implementation cost (Million USD)						557,897,042

ATI (Agricultural Transformation Institute), BETin (Bio and Emerging Technology Institute), CSO (Civil Society Organization), EAA (Ethiopian Agricultural Authority), EBI (Ethiopian Biodiversity Institute), ECA (Ethiopian Conservation Authority), EFD (Ethiopian Forest Development), EHPEA (Ethiopian Horticulture Producer Exporters Association), EIAR (Ethiopian Institute of Agricultural Research), EIC (Ethiopian Investment Commission), EIH, (Ethiopian Investment Holdings), EIPA (Ethiopian Intellectual Property Authority), EMDIDI (Ethiopian Meat and Dairy Industry Development Institute), EPA (Environmental Protection Authority), EPOSPEA (Ethiopian Pulses, Oil Seeds and Species Processors Exporters Association), ESS (Ethiopian Statistical Service), SSGI (Space Science and Geo-spatial Institute), EWCA (Ethiopian Wildlife Conservation Authority), FAA (Federal Audit Authority), HILs (Higher Learning Institutions), MinT (Ministry of Innovation and Technology), MoA (Ministry of Agriculture), MoE (Ministry of Education), MoF (Ministry of Finance), MoFA (Ministry of Foreign Affairs), MoH (Ministry of Health), MoI (Ministry of Industry), MoIL (Ministry of Irrigation and Lowlands), MoJ (Ministry of Justice), MoLSA (Ministry of Labor and Social Affairs), MoM (Ministry of Mines), MoPD (Ministry of Planning and Development), MoR (Ministry of Revenue), MoT (Ministry of Trade), MoUI (Ministry of Urban Infrastructure), MoWE (Ministry of Water and Energy), MoWSA (Ministry of Women and Social Affairs), NGOs (Non-governmental Organizations), PSI (Policy Studies Institute)

Ethiopia's Updated National Biodiversity Strategy and Action Plan 2025-2030

Table 12: Relationships between Ethiopia's National Biodiversity Targets and the GBF

Ethiopia's National Biodiversity Targets by Strategic Goals	K-M GBF Targets (No.)
GBF Goal A: Ecosystems are conserved, extinctions are halted and genetic diversity is maintained	
Eth - Target 1: By 2030, areas of high biodiversity importance are spatially planned, effectively managed and increased from the existing 30% to 80%, addressing land-use changes with full participation of stakeholders.	1
Eth - Target 2: By 2030, forest coverage is increased from 23.6% to 30%, area of degraded wetland decreased by 20% from the existing 27,142.5 km ² and degraded terrestrial land decreased by 20% from the existing 85,243 km ² , extent of conversion of grazing land decreased from 43.7% to 30% through fostering ecosystem-based management approach, thereby ensuring at least 30% of the degraded land is restored.	2
Eth - Target 3: By 2030, ecologically representative protected areas including biosphere reserves and inland waters are increased from 12 to 30%, while the existing 0.08% ecosystem and species-based <i>in situ</i> sites are doubled through enhancing their ecological connectivity and effective management by actively engaging local communities.	3
Eth - Target 4: By 2030, <i>in situ</i> conservation of agrobiodiversity is increased from 178 to 205 sites for conservation of crop varieties and animal breeds on farm, and management standards of the existing are improved.	3
Eth - Target 5: By 2030, <i>ex situ</i> conservation; emphasizing endemic, endangered, economically and ecologically important species of crop varieties of 92,258 accessions, 3,644 accessions of forest and rangeland plant species, 120,000 straws of animal breeds and 1,350 microbial species/strains are increased by 10%, 25%, 50%, and 10%, respectively; and standards of the existing <i>ex situ</i> conservation are improved.	4
Eth - Target 6: By 2030, proportion of areas invaded by invasive alien species reduced by 50% from the existing 3,949,314 ha through eradicating the existing invasions and preventing their introduction and expansion.	6
Eth - Target 7: By 2030, pollution of major ecosystems is reduced by at least 10% from the existing 10 million tones by application of innovative measures, with emphasis on municipal and industrial sources.	7
Eth - Target 8: By 2030, land-based mitigation and adaptation measures contribute to the reduction of at least 152.75 MtCO ₂ e from the BAU scenario of 346 MtCO ₂ e, and inter-sectoral coordination towards biodiversity mainstreaming in the climate actions is increased.	8

Ethiopia's Updated National Biodiversity Strategy and Action Plan 2025-2030

GBF Goal B: Biodiversity is sustainably used and its contribution to people are maintained, enhanced or restored	
Eth - Target 9: By 2030, unsustainable utilization of wild genetic resources is reduced ensuring that all uses, including harvesting and trading activities are implemented sustainably, safely and legally	9
Eth - Target 10: By 2030, biodiversity issues are integrated into agricultural systems through application of biodiversity-friendly practices and use of improved decision support processes in agricultural production systems, where at least 25% of agricultural land is put under agro-ecological practices.	10
Eth - Target 11: By 2030, 75 urban centers put 30% of their land under spatially planned green areas through biodiversity-inclusive urban planning.	12
GBF Goal C: Benefits from the use of genetic resources are shared and sustainably increased	
Eth - Target 12: By 2030, access to genetic resources for research and development of 294,616 crop and horticulture accessions, 5700 forest and rangeland plants accessions, 9,000 straws of semen of domestic animals, 620 accessions of microbial species/strains and 1500 access permits are increased by 32%, 18%, 67%, 17% and 55%, respectively and value addition and market linkage are carried-out for at least 18 biological commodities	13
Eth - Target 13: By 2028, biodiversity and ecosystem services related laws, including those associated with incentives are studied, reviewed and integrated into the national and local development policies, strategies and plans.	14
Eth - Target 14: By 2030, a system of regulation and guidelines formulated, integrated to tax and business laws and enforced to implement biodiversity compliance to off-set negative impacts of business activities on biodiversity.	15
Eth - Target 15: By 2028, biodiversity priorities and concerns are integrated into biosafety regulatory framework and capacity to regulate transaction of GMOs is enhanced.	17
Eth - Eth - Target 16: By 2030, capacity to implement biodiversity conservation, sustainable utilization and access and benefit sharing are improved by strengthening information technology, gene banks and laboratory infrastructures through technology transfer, and scientific and technical cooperation; including through South-South and North-South cooperation.	20
Eth - Target 17: By 2030, data, information and comprehensive knowledge and innovations related to biodiversity values, ecosystem functioning, status and trends are generated, and the consequences of biodiversity loss are determined, reviewed, compiled and made accessible to decision makers, practitioners and the public, and are applied in biodiversity related planning and decision-making processes.	21

Ethiopia's Updated National Biodiversity Strategy and Action Plan 2025-2030

Eth - Target 18: By 2030, gender equality and a gender-responsive approach for biodiversity actions are ensured through awareness, participation, and social inclusion of disability, youth, children, and other vulnerable groups, and the actions that the stakeholders can take to conserve and use biodiversity sustainably are improved.	23
GBF Goal D: Biodiversity funding gap of 700 billion USD is closed by ensuring adequate means of implementation are available	
Eth - Target 19: By 2029, mobilization of financial resources from domestic sources required for effective implementation of the strategy by mandated sectoral institutions is increased at least by 57% and strategy is devised to secure additional funds from other internal and external sources.	19

CHAPTER EIGHT

8. IMPLEMENTATION ARRANGEMENTS

8.1. Coordination

The Ethiopian Biodiversity Institute (EBI) is responsible for the conservation and sustainable utilization of biodiversity, and ensuring access to genetic resources and the fair and equitable sharing of benefits arising from their use. It is also the Focal Institute to the Convention on Biological Diversity (CBD). Therefore, the Institute is tasked with the overall responsibility of coordinating the planning and implementation of the National Strategic Plan 2025-2030 (Eth. NBSAP 2025-2030). To facilitate the implementation, EBI will re-establish the National Biodiversity Strategy and Action Plan Technical Committee (NBSAP-TC) and make use of the existing National Biodiversity Platform (NBP) that will be involved at different capacities during the planning and implementation periods. The Institute will also formulate a working modality that should be agreed upon by the lead implementing agencies to run the smooth implementation the Eth. NBSAP 2025-2030.

National Biodiversity Strategy and Action Plan Technical Committee

The National Biodiversity Strategy and Action Plan Technical Committee (NBSAP-TC) is a technical wing that oversees the implementation of the Eth. NBSAP 2025-2030. The NBSAP-TC consists of 20 members that are comprised of heads of Plan Directorate Directors of the lead implementing agencies and representatives from local and international NGOs. The Chairperson of the NBSAP-TC will be the Director General of the Coordinating Institute, and the Vice Chairperson will be elected by the Technical Committee from among its members, with NBSAP Coordinator serving as the secretary of the Committee. The NBSAP-TC shall convene its meeting every six months, in the first weeks of January and July. The NBSAP-TC may convene urgent meeting in addition to its scheduled biannual meetings, as deemed necessary.

The primary responsibility of the NBSAP-TC is to evaluate the progress of the Eth. NBSAP 2025-2030 implementation. Additionally, it oversees the approval of various formats and strategies, including communication, education, public awareness, financial resource mobilization, monitoring and evaluation, and reporting. Furthermore, the NBSAP-TC is responsible for carrying-out any additional activities recommended by the National Biodiversity Platform.

The progress of implementation reported in the meetings of the NBSAP-TC will be synthesized and presented to the National Biodiversity Platform by the chairperson of the NBSAP-TC. Upon the direction from the National Biodiversity Platform, the NBSAP-TC may establish *ad hoc* working group comprised fully of its members, its members along with other experts or entirely of other experts when issues such as ground-truthing are required.

National Biodiversity Platform

The National Biodiversity Platform (NBP) serves as a collaborative and multi-stakeholder forum to coordinate, strategize, and promote the conservation and sustainable use of biodiversity at the national level. The NBP is comprised of 131 members that represent seven different categories, namely: parliament, PM office, Sectoral Ministries; academic and research institutions (universities, training centers), civil societies (professional societies, religious institutions, environmental advocacy groups and volunteers), private sectors, communities (local communities, Youth and urban groups), development partners (international organizations and NGOs), and media (public and private media).

The chairperson of the NBP will be a chairman of the Agricultural Affairs Standing Committee of the House of People's Representatives (HoPRs) of the Federal Democratic Republic of Ethiopia (FDRE) and the vice Chairperson will be the Minister of Ministry of Agriculture. The secretary of the committee will be the Director General of the Ethiopian Biodiversity Institute. The NBP shall meet twice a year, following the meetings of the NBSAP-TC. Based on the summary of the findings from the NBSAP-TC, meetings, NBP

will provide strategic directions to the NBSAP-TC. In addition to its biannual meetings, the NBP may convene an urgent meeting upon the request by its chairperson.

8.2. Resource Mobilization

The cost of implementation of the Eth. NBSAP 2025-2030 National Targets is estimated at 557,897,042 USD. The cost has been computed at the targets and actions level.

The cost of implementing the Eth. NBSAP 2025-2030 National Targets is planned to be conducted through two financing mechanisms. About 57% of the implementation cost is assumed to be covered through the budget allocated by the government, while about 43% will be covered by budget mobilized from external sources. Most of the actions set in the Eth. NBSAP 2025-2030 are planned in a way that they can be mainstreamed into different sectoral and cross-sectorial plans, and will be implemented using government budgets allocated to the sectors. To secure these funds, EBI will develop a separate portfolio of funding strategy, which will then be approved by the NBSAP-TC. The strategy will also contain the disbursement component to release funds secured from different sources for the implementing agencies. The funding strategy will serve as the operational document for the funding mechanism for the implementation period of the Eth. NBSAP 2025-2030.

8.3. Plans for Clearing House Mechanism

The absence of national biodiversity data sharing mechanism resulting in weak information exchange is still a persisting challenge. The Clearing House Mechanism (CHM), which was established by the SCBD worldwide for the purposes of availing information to interested parties, is one of the crucial tools to fill such gaps and this should be supported by networking national stakeholders. Therefore, due attention will be given to strengthen the existing mechanism, including its accessibility to the stakeholders.

8.4. Monitoring and Evaluation

Monitoring and evaluation will be conducted by a group of experts from different disciplines set by the National Biodiversity Strategy and Action Plan Technical Committee (NBSAP-TC). The monitoring and evaluation outcomes will be reported to the NBSAP-

TC, the National Steering Committee, and National Biodiversity Platform (NBP) in a step-by-step manner, based on the agreed upon format and work plan that takes into account of the agreed up-on indicators to the targets. EBI will develop monitoring and evaluation formats, which will be approved by NBSAP-TC.

8.5. Reporting

The Focal Persons to be assigned by lead agencies are required to submit their respective implementation progress reports to EBI on quarterly basis. These reports will be compiled and presented by the Project Coordinator to the NBSAP-TC at its biannual meetings. The NBSAP-TC meetings will be conducted in January and July. In the case of July meeting, the findings of both NBSAP-TC meetings will be synthesized and presented to NSC by the Chairperson of NBSAP-TC for evaluation and to NBP so that the latter can provide strategic directions on issues that need rectification during the planning of the forthcoming fiscal year. Furthermore, the coordinating Institute will communicate the annual progress report and the outcomes of the implementation to the relevant international bodies such as the SCBD.

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ANNEXES

Annex I. The Red List of endemic trees and shrubs of Ethiopia

No.	Name of the Species	Status	Distribution in Ethiopian Floristic Region (s)*
1	<i>Acacia bricchettiana</i>	CR	HA
2	<i>Acacia negrii</i>	VU	GD, WU, GJ, HA, SD
3	<i>Acacia prasinata</i>	CR	AF, SU
4	<i>Acalypha marissima</i>	CR	WG
5	<i>Acanthus sennii</i>	NT	GD, GJ, WG, SU, HA, AR, BA, KF, GG, SD
6	<i>Argyrolobium schimperianum</i>	EN	TU, GD, GJ, SU
7	<i>Barleria longissima</i>	CR	SD
8	<i>Becium formosum</i>	VU	BA
9	<i>Blepharis cuspidate</i>	CR	SD
10	<i>Blepharispermum obovatum</i>	CR	BA
11	<i>Boswellia ogadensis</i>	CR	HA
12	<i>Boswellia pirottae</i>	VU	GD, GJ, WU, SU, KF
13	<i>Cadaba divericata</i>	VU	SD, HA
14	<i>Cladostigma nigistiae</i>	EN	SD
15	<i>Commiphora monoica</i>	CR	BA
16	<i>Crotalaria agatiflora</i>	NT	SU, HA, IL, AR, GG
17	<i>Crotalaria exaltata</i>	EN	SU, BA, KF, SD
18	<i>Crotalaria intonsa</i>	VU	GD, SU, KF, SD
19	<i>Crotalaria rosenii</i>	NT	SU, AR, BA, KF, SD
20	<i>Crotalaria sacculata</i>	CR	SD
21	<i>Cussonia ostinii</i>	NT	WU, GD, GJ, WG, IL, AR, KF, GG
22	<i>Delosperma abyssinica</i>	CR	TU
23	<i>Delosperma schimperi</i>	EN	TU, WU
24	<i>Dombeya kefaensis</i>	EN	KF
25	<i>Dombeya longebracteolata</i>	VU	KF, GG, SD
26	<i>Echinops ellenbeckii</i>	EN	SU, AR, HA
27	<i>Erythrina Burana</i>	VU	HA, BA?
28	<i>Erythrococca uniflora</i>	EN	SD
29	<i>Euphorbia burger</i>	CR	HA
30	<i>Euphorbia dalettiensis</i>	EN	SD, HA
31	<i>Euphorbia doloensis</i>	CR	SD
32	<i>Euphorbia ellenbeckii</i>	EN	SD
33	<i>Erythrophysa septentrionalis</i>	EN	HA
34	<i>Euphorbia baleensis</i>	CR	BA
35	<i>Euphorbia betulicortex</i>	CR	SD
36	<i>Euphorbia fissispina</i>	EN	SD
37	<i>Euphorbia makallensis</i>	CR	TU
38	<i>Euphorbia nigrispinioides</i>	VU	SU, HA?

Ethiopia's Updated National Biodiversity Strategy and Action Plan 2025-2030

No.	Name of the Species	Status	Distribution in Ethiopian Floristic Region (s)*
39	<i>Euphorbia ogadenensis</i>	CR	BA, HA
40	<i>Euphorbia somalensis</i>	CR	HA
41	<i>Euphorbia tetracantha</i>	CR	BA
42	<i>Euphorbia uniglans</i>	EN	SD
43	<i>Euryops pinifolius</i>	VU	WU, GJ, SU
44	<i>Hildebrandtia aloysii</i>	VU	HA, BA
45	<i>Hildebrandtia diredawaensis</i>	EN	HA
46	<i>Hybanthus puberulus</i>	CR	SD
47	<i>Ficus ruspolii</i>	VU	SD, KF
48	<i>Helichrysum elephantium</i>	VU	BA, GG, SD
49	<i>Helichrysum horridum</i>	EN	GD, SD
50	<i>Hybanthus puberulus</i>	CR	SD
51	<i>Hypericum gnidiifolium</i>	VU	TU, SU
52	<i>Indigofera curvirostrata</i>	CR	SD
53	<i>Indigofera ellebenbeckii</i>	CR	HA
54	<i>Hibiscus boranensis</i>	VU	SD
55	<i>Indigofera kelleri</i>	CR	HA
56	<i>Indigofera rothii</i>	EN	SU, HA
57	<i>Inula arbuscula</i>	CR	GD
58	<i>Inula confertiflora</i>	NT	WU, SU, HA, BA, AR
59	<i>Kanahia carlsbergiana</i>	EN	AR, BA
60	<i>Lantana kisi</i>	EN	TU
61	<i>Lindenbergia awashensis</i>	EN	AF, SU
62	<i>Maerua boranensis</i>	CR	SD
63	<i>Maytenus addat</i>	NT	SU, AR, SD, GG
64	<i>Kirkia burger</i>	VU	SD, BA, HA
65	<i>Kleinia gypsophila</i>	CR	HA
66	<i>Kleinia negrii</i>	EN	WU, HA, SD
67	<i>Kotschya recurvifolia</i>	VU	BA, HA, KF, SD
68	<i>Maytenus cortii</i>	CR	GD
69	<i>Maytenus harenensis</i>	CR	BA
70	<i>Monadenium shebeliensis</i>	CR	HA
71	<i>Moringa rivae</i> subsp. <i>longisiliqua</i>	VU	SD, BA, HA
72	<i>Phyllanthus dewildiorum</i>	EN	WG, KF
73	<i>Phyllanthus limmuensis</i>	VU	GD, GJ, WG, IL, KF
74	<i>Polyscias farinose</i>	VU	TU, GD, GJ, SU, KF
75	<i>Polysphaeria aethiopica</i>	EN	SD, BA
76	<i>Otostegia tomentosa</i> subsp. <i>steudneri</i>	VU	GD, WU
77	<i>Phyllanthus borenensis</i>	CR	SD
78	<i>Pseudoblepharispermum bremeri</i>	CR	HA

Annex I. The red list of, ...

No.	Name of the Species	Status	Distribution in Ethiopian Floristic Region (s)*
79	<i>Rhynchosia erlangeri</i>	EN	HA
80	<i>Rhynchosia splendens</i>	CR	GD
81	<i>Rinorea friisii</i>	EN	IL, KF
82	<i>Rubus aethiopicus</i>	EN	SU, GD
83	<i>Rubus erlangeri</i>	EN	BA, SD
84	<i>Sparmannia macrocarpa</i>	NT	GD, GJ, WU, SU, AR, WG, KF, GG, HA
85	<i>Stomatanthes meyeri</i>	CR	KF
86	<i>Tacazzea venosa</i>	EN	TU, GD, GJ
87	<i>Taverniera abyssinica</i>	CR	TU, SU
88	<i>Ruellia boranica</i>	EN	SD
89	<i>Satureja unguentaria</i>	EN	GD
90	<i>Sesbania melanocaulis</i>	EN	KF, WG
91	<i>Tephrosia dichroocarpa</i>	EN	TU, GD, GJ
92	<i>Terminalia hararensis</i>	DD	BA, HA
93	<i>Terminalia hecistocarpa</i>	DD	BA
94	<i>Tragia abortive</i>	VU	GG
95	<i>Tragia negeliensis</i>	VU	SD, BA
96	<i>Verbascum arbusculum</i>	CR	SU
97	<i>Wellstedia filtuensis</i>	CR	SD
98	<i>Wendlandia arabica</i> subsp. <i>aethipica</i>	EN	SU
99	<i>Verbascum arbusculum</i>	CR	SU
100	<i>Vernonia cylindrical</i>	VU	TU, GD, GJ, WG
101	<i>Vernonia dalettiensis</i>	CR	HA
102	<i>Vernonia tewoldei</i>	EN	KF, BA
103	<i>Vernonia thulinii</i>	CR	WG

* Distribution in Ethiopian Floristic Region(s): BA (Bale), GD (Gonder), GG (Gamo Gofa), GJ (Gojam), HA (Harerge), IL (Iluababor), KF (Kafa), SD (Sidamo), SU (Shewa Upland), TU (Tigray Upland), WG (Welega) and WU (Wello Upland).

* Note: CR = Critically Endangered, EN = Endangered, VU = Vulnerable (Endemic species are mostly found in highland ecosystems, especially the Bale Mountains, Simien Mountains, and isolated forest patches).

Source: Jose I., Ensermu Kelbessa and Sebsebe Demissew (2005)

Annex II. Indigenous and exotic breeds' diversity in each farm animal species of Ethiopia

Species	Breed number	Breed names
Cattle	27	Abergelle, Adwa, Afar, Ambo, Arado, Arsi (Arsi, Bale, Jemjem), Begait, Begaria, Borena, Fellata (Fellata, Qocherie, Ruttana), Fogera, Gamo-Gofa (Gamo, Gofa), Gojam Highland Zebu, Guraghe (Guraghe, Hadiya, Jimma), Hammer, Harar, Horro, Irob, Kereyu, Mahibere-Silassie Composite, Medenes, Mursi, Nuer, Ogaden (Ogaden, Jigjiga), Raya, Sheko, Smada
Sheep	15	Afar, Arsi-Bale, Begait, Black Head Somali, Bonga (Bonga, Wolaita, Gamogofa), Doyogena (Doyogena, Adilo), Fellata, Gummer (Gummer, Guraghe, Abera), Gumuz, Horro, Ruthana, Short fat tailed (Sekota/Abergelle, Farta, Tikur, Wello and Menz), Simien, Tigray highland sheep, Washera
Goats	11	Abergelle, Afar, Arsi-Bale, Begaite, Central and North highland (Ambo, Agew, Maefur), Hararghe Highland, Keffa, Long eared Somali, Short eared Somali, Western lowlands (Gumuz, Gambella), Woyto-Guji
Chicken	17	Adwa, Bale, Chefe (Chefe, Arsi, Siltie), Farta (Farta, Mello-Hamusit), Gambella, Gasgie (Gasgie, Naked neck, Gugut), Gelilia (Gelilia, DebreEllias, Guangua, Mecha), Hemete, Horro, Jarso, Konso (Konso, Guji, Borana, Omo), Kuakuate, Mandura, Tepi (Tepi, Sheka, Keffa), Tilili, Welkaite, Yebereha Tsehaye
Camel	8	Amibara, Borana, Gelleb, Hoor, Jijiga, Liben, Mille, Shinille
Horses	8	Abyssinian, Bale, Borana, Horro, Keffa, Kundido feral horse Selale, Wilwal /Ogaden
Donkey	6	Abyssinian, Afar, Hararghe, Ogaden, Omo, Sinnar
Bees	8	<i>Apis mellifera</i> , <i>Apis florea</i> , <i>Meliponula beccarii</i> , <i>Liotrigona bottegoi</i> , <i>Liotrigona baleensis</i> , <i>Hypotrigona gribodoi</i> , <i>Hypotrigona ruspolii</i> , <i>Plebeina armata</i>

Source: Ethiopian Biodiversity Institute (2024b).

Annex III. List of Ethiopian Important Bird Areas in Priority Order for Conservation

Site Code	Site Name	Region
016	Bale Mts. Nat. Park	4
011	Awash Nat. Park	4,2
059	Simen Mts. Nat.Park	3
007	Ankober/Debre Sina Escarpment	3
064	Yabello Sanctuary	4
040	Guassa (Menz)	3
055	Nechisar Nat. Park	7
002	Abijatta-Shalla Lakes Nat. Park	4
008	Arero Forest	4
012	Awash Valley	2
037	Genale River	4
052	Metu-Gore Tepi Forests	4
003	Aba Samuel Wetlands	4
044	Koka Dam/Gelila Lake	4
013	Awi Zone	3
015	Bahir Dar Lake-Tana	3
021	Bogol Manyo	5
035	Gambella Nat. Park	12
049	Mankubsa-Welenso Forest	4
061	Sululta Plains	4
062	Tiro Boter-Becho Forest	4
070	Chilimo Forest	4
073	Senkelle Sanctuary	4
024	Chelekleka Swamp	4
006	Anferera Forest	4
023	Boyo Wetland	7
027	Dawa- Wachille	4
031	Denkoro Forest	3

Ethiopia's Updated National Biodiversity Strategy and Action Plan 2025-2030

036	Gefersa Reservoir	14
042	Jemma/Jara Valleys	3
048	W/Shebelle River/Warder	5
051	Menagesha Forest	4
053	Mid-Abbay River Basin	3
025	Chew Bahir Lake	7
032	Entoto Natural Park	14
033	Fincha'a-Chomen Swamps	4
046	Langano Lake	4
047	Liben Plain-Neghelle Woodlands	4
066	Yegof Forest	3
017	Baro River	12
038	Green Lake	4
005	Aliyu Amba/Dulecha	3,2
028	Desa'a Forest	1
029	Dilu Meda (Tefki)	4
034	Fogera plains	3
060	Sof Omar	4
066	Yangudi Rassa Park	2
072	Jibat Forest	4
009	Ashenge Lake	1
064	Turkana Lake/Omo Delta	7
001	Lake Abbe	2
018	Berga Floodplains	4
039	Gudo Plains	4
043	Koffe Swamp	4
054	Mugo Highlands	7
070	Zuqualla Mt.	4
010	Lake Awassa	7
004	Alemaya/Adele Lakes	4

Ethiopia's Updated National Biodiversity Strategy and Action Plan 2025-2030

014	Babile Elephant Sanctuary	4
019	Bishoftu Lake	4
020	Bisidimo	4
022	Bonga Forest	7
026	Choke Mountains	3
045	Konso-Segen Valley	7
056	Mago Nat. Park	7
057	Omo National Park	7
061	Shiek Hussien	4
069	Zeway Lake	4
041	Hugumburda/Grat Kahsu Forest	1
058	Shire Lowlands	1
050	Melka Wakena	4
068	Yerer Forest	4
030	Dindin Arba Gugu Forest	4

Annex IV. Wild mammals of Ethiopia rated as critically endangered, endangered or vulnerable

Critically Endangered	Endangered	Vulnerable
African Wild Ass (<i>Equus africanus</i>)	Grevy's Zebra (<i>Equus grevyi</i>)	African Elephant (<i>Loxodonta africana</i>).
Bilen Gerbil (<i>Gerbillus bilensis</i>)*	Mountain Nyala (<i>Tragelaphus buxtoni</i>)*	Ammodile (Gerbil Family) (<i>Ammodillus imbellis</i>)
Black Rhinoceros (<i>Diceros bicornis</i>)	Nubian Ibex (<i>Capra nubiana</i>)	Bailey's Shrew (<i>Crocidura baileyi</i>)*
Ethiopian Wolf (Simien Jackal) (<i>Canis simensis</i>)*	Wild Dog (<i>Lycaon pictus</i>)	Bale Shrew (<i>Crocidura bottegoides</i>) *
Guramba Shrew (<i>Crocidura phaeura</i>)*		Beira Antelope (<i>Dorcatragus megalotis</i>)
Haremma Shrew (<i>Crocidura haremma</i>)*		Cheetah (<i>Acinonyx jubatus</i>)
MacMillan's Shrew (<i>Crocidura macmillani</i>) *		Dibatag (<i>Ammodorcas clarkei</i>)
Walia Ibex (<i>Capra walie</i>) *		Dorcas Gazelle (<i>Gazella dorcas</i>)
		Glass's Shrew(<i>Crocidura glassi</i>) *
		Large-eared Free-tailed Bat (<i>Otomops martiensseni</i>)
		Lesser Horseshoe Bat (<i>Rhinolophus hipposideros</i>)
		Lion (<i>Panthera leo</i>)
		Moorland Shrew (<i>Crocidura lucina</i>) *
		Morris's Bat (<i>Myotis morrisoni</i>)
		Mouse-tailed Bat Species (<i>Rhinopoma macinnesi</i>)
		Natal Free-tailed Bat (<i>Mormopterus acetabulosus</i>)

Ethiopia's Updated National Biodiversity Strategy and Action Plan 2025-2030

	Nikolaus's Mouse (<i>Megadendromus nikolausi</i>) *
	Patrizi's Trident Leaf-nosed Bat(<i>Asellia patrizii</i>)
	Red-fronted Gazelle (<i>Gazella rufifrons</i>)
	Rupp's Mouse (<i>Myomys ruppi</i>)*
	Scott's Mouse-eared Bat (<i>Myotis scotti</i>)
	Soemmerring's Gazelle (<i>Gazella soemmerringii</i>)
	Speke's Gazelle (<i>Gazella spekei</i>)
	Spotted-necked Otter (<i>Lutra maculicollis</i>)
	Stripe-backed Mouse (<i>Muriculus imberbis</i> *

* Endemic to Ethiopia; Source: IUCN (2004)

Annex V: Threatened Wild Mammals of Ethiopia (2004 IUCN Red List)

No.	Common Name	Scientific Name	Status	Endemic
1	African Wild Ass	<i>Equus africanus</i>	CR	No
2	Bilen Gerbil	<i>Gerbillus bilensis</i>	CR	Yes
3	Black Rhinoceros	<i>Diceros bicornis</i>	CR	No
4	Ethiopian Wolf	<i>Canis simensis</i>	CR	Yes
5	Guramba Shrew	<i>Crocidura phaeura</i>	CR	Yes
6	Haremma Shrew	<i>Crocidura haremma</i>	CR	Yes
7	MacMillan's Shrew	<i>Crocidura macmillani</i>	CR	Yes
8	Walia Ibex	<i>Capra walie</i>	CR	Yes
9	Grevy's Zebra	<i>Equus grevyi</i>	EN	No
10	Mountain Nyala	<i>Tragelaphus buxtoni</i>	EN	Yes
11	Nubian Ibex	<i>Capra nubiana</i>	EN	No
12	African Wild Dog	<i>Lycaon pictus</i>	EN	No
13	African Elephant	<i>Loxodonta africana</i>	VU	No
14	Ammodile	<i>Ammodillus imbellis</i>	VU	No
15	Bailey's Shrew	<i>Crocidura baileyi</i>	VU	Yes
16	Bale Shrew	<i>Crocidura bottegoides</i>	VU	Yes
17	Beira Antelope	<i>Dorcatragus megalotis</i>	VU	No
18	Cheetah	<i>Acinonyx jubatus</i>	VU	No
19	Dibatag	<i>Ammodorcas clarkei</i>	VU	No
20	Dorcas Gazelle	<i>Gazella Dorcas</i>	VU	No
21	Glass's Shrew	<i>Crocidura glassi</i>	VU	Yes
22	Large-eared Free-tailed Bat	<i>Otomops martiensseni</i>	VU	No
23	Lesser Horseshoe Bat	<i>Rhinolophus hipposideros</i>	VU	No

Ethiopia's Updated National Biodiversity Strategy and Action Plan 2025-2030

24	Lion	<i>Panthera leo</i>	VU	No
25	Moorland Shrew	<i>Crocidura Lucina</i>	VU	Yes
26	Morris's Bat	<i>Myotis morrиси</i>	VU	No
27	Macinnes's Mouse-tailed Bat	<i>Rhinopoma macinnesi</i>	VU	No
28	Natal Free-tailed Bat	<i>Mormopterus acetabulosus</i>	VU	No
29	Nikolaus's Mouse	<i>Megadendromus nikolausi</i>	VU	Yes
30	Patrizi's Trident Leaf-nosed Bat	<i>Asellia patrizii</i>	VU	No
31	Red-fronted Gazelle	<i>Gazella rufifrons</i>	VU	No
32	Rupp's Mouse	<i>Myomys ruppi</i>	VU	Yes
33	Scott's Mouse-eared Bat	<i>Myotis scotti</i>	VU	Yes
34	Soemmerring's Gazelle	<i>Gazella soemmerringii</i>	VU	No
35	Speke's Gazelle	<i>Gazella spekei</i>	VU	No
36	Spotted-necked Otter	<i>Lutra maculicollis</i>	VU	No
37	Stripe-backed Mouse	<i>Muriculus imberbis</i>	VU	Yes

Note: CR = Critically Endangered, EN = Endangered, VU = Vulnerable (Endemic species are mostly found in highland ecosystems, especially the Bale Mountains, Simien Mountains, and isolated forest patches).

Annex VI. Summary of the threats, root causes, consequences and associated gaps related to biodiversity loss in Ethiopia

Threats	Root causes	Consequences	Gaps/Barriers
Habitat conversion	<ul style="list-style-type: none"> • increasing human population, • agricultural expansion, and settlement/urbanization • Land-use/land cover change 	<ul style="list-style-type: none"> • deforestation • loss of species • ecological disturbances • loss of ecosystem services 	<ul style="list-style-type: none"> • lack of adequate capacity, commitment, organizational set-up and incentives to implement land use policy properly
Unsustainable utilization <ul style="list-style-type: none"> • Over-exploitation 	Due to rising human population: <ul style="list-style-type: none"> • increasing demand for wood products such as firewood, charcoal and harvesting for construction materials, and for NTFPs such as medicines, spices and stimulants • hunting/harvesting of various animals from aquatic and terrestrial environments for food, medicine, cosmetics and other purposes • limited alternative livelihoods • poverty 	<ul style="list-style-type: none"> • ecological disturbances • loss of species • loss of ecosystem services 	<ul style="list-style-type: none"> • lack of sustainable use regulation and monitoring systems • lack of alternative livelihood and energy sources
	<ul style="list-style-type: none"> • Overgrazing/browsing 	<ul style="list-style-type: none"> • increasing livestock number 	<ul style="list-style-type: none"> • regeneration affected • loss of species • ecosystem disturbances • loss of ecological services
Replacement of farmers' varieties and breeds	<ul style="list-style-type: none"> • higher demand for food to feed growing population • lower yields from farmers' varieties/breeds 	<ul style="list-style-type: none"> • loss of farmers' varieties and breeds 	<ul style="list-style-type: none"> • agricultural policy promoting the use of improved varieties • lack of incentive for maintaining farmers' varieties/breeds

Ethiopia's Updated National Biodiversity Strategy and Action Plan 2025-2030

Invasive species	<ul style="list-style-type: none"> • lack of proper management and/or quarantine system 	<ul style="list-style-type: none"> • loss of species and ecosystem services • health problems • loss of agricultural production • food insecurity 	<ul style="list-style-type: none"> • lack of monitoring of the implementation strategy on the status and trends of invasive species • lack of capacity and resources to manage invasive species
Climate change	<ul style="list-style-type: none"> • deforestation and unsustainable land use systems • emission of greenhouse gases 	<ul style="list-style-type: none"> • natural calamities (drought, floods, frost, etc.) • decline in production and productivity, disease outbreak and loss of species 	<ul style="list-style-type: none"> • low level of climate change mitigation mechanisms • lack of awareness • weak adaptation capacity
Pollution	<ul style="list-style-type: none"> • improper use of agro-chemicals • unregulated discharge of pollutants 	<ul style="list-style-type: none"> • ecological disturbances • loss of species • loss of ecological services 	<ul style="list-style-type: none"> • poor implementation of environmental regulations • poor wetland management • poor waste management systems
Policies and institutions	<ul style="list-style-type: none"> • Limitation in implementation at grassroot level 	<ul style="list-style-type: none"> • habitat degradation • environmental pollution 	<ul style="list-style-type: none"> • limited implementation capacity, including awareness

Annex VII: K-M GBF Goals and Targets (CBD/COP/DEC/15/4 19 December 2022)

GOAL A

The integrity, connectivity and resilience of all ecosystems are maintained, enhanced, or restored, substantially increasing the area of natural ecosystems by 2050;

Human induced extinction of known threatened species is halted, and, by 2050, the extinction rate and risk of all species are reduced tenfold and the abundance of native wild species is increased to healthy and resilient levels;

The genetic diversity within populations of wild and domesticated species, is maintained, safeguarding their adaptive potential.

GOAL B

Biodiversity is sustainably used and managed and nature's contributions to people, including ecosystem functions and services, are valued, maintained and enhanced, with those currently in decline being restored, supporting the achievement of sustainable development for the benefit of present and future generations by 2050.

GOAL C

The monetary and non-monetary benefits from the utilization of genetic resources and digital sequence information on genetic resources, and of traditional knowledge associated with genetic resources, as applicable, are shared fairly and equitably, including, as appropriate with indigenous peoples and local communities, and substantially increased by 2050, while ensuring traditional knowledge associated with genetic resources is appropriately protected, thereby contributing to the conservation and sustainable use of biodiversity, in accordance with internationally agreed access and benefit-sharing instruments.

GOAL D

Adequate means of implementation, including financial resources, capacity-building, technical and scientific cooperation, and access to and transfer of technology to fully implement the Kunming-Montreal Global Biodiversity Framework are secured and equitably accessible to all Parties, especially developing country Parties, in particular the least developed countries and small island

developing States, as well as countries with economies in transition, progressively closing the biodiversity finance gap of \$700 billion per year, and aligning financial flows with the Kunming-Montreal Global Biodiversity Framework and the 2050 Vision for biodiversity.

TARGET 1

Ensure that all areas are under participatory, integrated and biodiversity inclusive spatial planning and/or effective management processes addressing land- and sea-use change, to bring the loss of areas of high biodiversity importance, including ecosystems of high ecological integrity, close to zero by 2030, while respecting the rights of indigenous peoples and local communities.

TARGET 2

Ensure that by 2030 at least 30 per cent of areas of degraded terrestrial, inland water, and marine and coastal ecosystems are under effective restoration, in order to enhance biodiversity and ecosystem functions and services, ecological integrity and connectivity.

TARGET 3

Ensure and enable that by 2030 at least 30 per cent of terrestrial and inland water areas, and of marine and coastal areas, especially areas of particular importance for biodiversity and ecosystem functions and services, are effectively conserved and managed through ecologically representative, well-connected and equitably governed systems of protected areas and other effective area-based conservation measures, recognizing indigenous and traditional territories, where applicable, and integrated into wider landscapes, seascapes and the ocean, while ensuring that any sustainable use, where appropriate in such areas, is fully consistent with conservation outcomes, recognizing and respecting the rights of indigenous peoples and local communities, including over their traditional territories.

TARGET 4

Ensure urgent management actions to halt human induced extinction of known threatened species and for the recovery and conservation of species, in particular threatened species, to significantly reduce extinction risk, as well as to maintain and restore the genetic diversity within and between populations of native, wild and domesticated species to maintain their adaptive potential, including

through *in situ* and *ex situ* conservation and sustainable management practices, and effectively manage human-wildlife interactions to minimize human-wildlife conflict for coexistence.

TARGET 5

Ensure that the use, harvesting and trade of wild species is sustainable, safe and legal, preventing overexploitation, minimizing impacts on non-target species and ecosystems, and reducing the risk of pathogen spillover, applying the ecosystem approach, while respecting and protecting customary sustainable use by indigenous peoples and local communities.

TARGET 6

Eliminate, minimize, reduce and or mitigate the impacts of invasive alien species on biodiversity and ecosystem services by identifying and managing pathways of the introduction of alien species, preventing the introduction and establishment of priority invasive alien species, reducing the rates of introduction and establishment of other known or potential invasive alien species by at least 50 per cent by 2030, and eradicating or controlling invasive alien species, especially in priority sites, such as islands.

TARGET 7

Reduce pollution risks and the negative impact of pollution from all sources by 2030, to levels that are not harmful to biodiversity and ecosystem functions and services, considering cumulative effects, including:

(a) by reducing excess nutrients lost to the environment by at least half, including through more efficient

nutrient cycling and use; (b) by reducing the overall risk from pesticides and highly hazardous chemicals by at least half, including through integrated pest management, based on science, taking into account food security and livelihoods; and (c) by preventing, reducing, and working towards eliminating plastic pollution.

TARGET 8

Minimize the impact of climate change and ocean acidification on biodiversity and increase its resilience through mitigation, adaptation, and disaster risk reduction actions, including through

nature-based solutions and/or ecosystem-based approaches, while minimizing negative and fostering positive impacts of climate action on biodiversity.

TARGET 9

Ensure that the management and use of wild species are sustainable, thereby providing social, economic and environmental benefits for people, especially those in vulnerable situations and those most dependent on biodiversity, including through sustainable biodiversity-based activities, products and services that enhance biodiversity, and protecting and encouraging customary sustainable use by indigenous peoples and local communities.

TARGET 10

Ensure that areas under agriculture, aquaculture, fisheries and forestry are managed sustainably, in particular through the sustainable use of biodiversity, including through a substantial increase of the application of biodiversity friendly practices, such as sustainable intensification, agroecological and other innovative approaches, contributing to the resilience and long-term efficiency and productivity of these production systems, and to food security, conserving and restoring biodiversity and maintaining nature's contributions to people, including ecosystem functions and services.

TARGET 11

Restore, maintain and enhance nature's contributions to people, including ecosystem functions and services, such as the regulation of air, water and climate, soil health, pollination and reduction of disease risk, as well as protection from natural hazards and disasters, through nature-based solutions and/or ecosystem-based approaches for the benefit of all people and nature.

TARGET 12

Significantly increase the area and quality, and connectivity of, access to, and benefits from green and blue spaces in urban and densely populated areas sustainably, by mainstreaming the conservation and sustainable use of biodiversity, and ensure biodiversity-inclusive urban planning, enhancing native biodiversity, ecological connectivity and integrity, and improving human health and well-being and connection to nature, and contributing to inclusive and sustainable urbanization and to the provision of ecosystem functions and services.

TARGET 13

Take effective legal, policy, administrative and capacity-building measures at all levels, as appropriate, to ensure the fair and equitable sharing of benefits that arise from the utilization of genetic resources and from digital sequence information on genetic resources, as well as traditional knowledge associated with genetic resources, and facilitating appropriate access to genetic resources, and by 2030, facilitating a significant increase of the benefits shared, in accordance with applicable international access and benefit-sharing instruments.

TARGET 14

Ensure the full integration of biodiversity and its multiple values into policies, regulations, planning and development processes, poverty eradication strategies, strategic environmental assessments, environmental impact assessments and, as appropriate, national accounting, within and across all levels of government and across all sectors, in particular those with significant impacts on biodiversity, progressively aligning all relevant public and private activities, and fiscal and financial flows with the goals and targets of this framework.

TARGET 15

Take legal, administrative or policy measures to encourage and enable business, and in particular to ensure that large and transnational companies and financial institutions:

- (a) Regularly monitor, assess, and transparently disclose their risks, dependencies and impacts on biodiversity, including with requirements for all large as well as transnational companies and financial institutions along their operations, supply and value chains, and portfolios;
- (b) Provide information needed to consumers to promote sustainable consumption patterns;
- (c) Report on compliance with access and benefit-sharing regulations and measures, as applicable; in order to progressively reduce negative impacts on biodiversity, increase positive impacts, reduce biodiversity-related risks to business and financial institutions, and promote actions to ensure sustainable patterns of production.

TARGET 16

Ensure that people are encouraged and enabled to make sustainable consumption choices, including by establishing supportive policy, legislative or regulatory frameworks, improving education and access to relevant and accurate information and alternatives, and by 2030, reduce the global footprint of consumption in an equitable manner, including through halving global food waste, significantly reducing overconsumption and substantially reducing waste generation, in order for all people to live well in harmony with Mother Earth.

TARGET 17

Establish, strengthen capacity for, and implement in all countries, biosafety measures as set out in Article 8(g) of the Convention on Biological Diversity and measures for the handling of biotechnology and distribution of its benefits as set out in Article 19 of the Convention.

TARGET 18

Identify by 2025, and eliminate, phase out or reform incentives, including subsidies, harmful for biodiversity, in a proportionate, just, fair, effective and equitable way, while substantially and progressively reducing them by at least \$500 billion per year by 2030, starting with the most harmful incentives, and scale up positive incentives for the conservation and sustainable use of biodiversity.

TARGET 19

Substantially and progressively increase the level of financial resources from all sources, in an effective, timely and easily accessible manner, including domestic, international, public and private resources, in accordance with Article 20 of the Convention, to implement national biodiversity strategies and action plans, mobilizing at least \$200 billion per year by 2030, including by:

(a) Increasing total biodiversity related international financial resources from developed

countries, including official development assistance, and from countries that voluntarily assume obligations of developed country Parties, to developing countries, in particular the least developed countries and small island developing States, as well as countries with economies in transition, to at least \$20 billion per year by 2025, and to at least \$30 billion per year by 2030;

- (b) Significantly increasing domestic resource mobilization, facilitated by the preparation and implementation of national biodiversity finance plans or similar instruments according to national needs, priorities and circumstances;
- (c) Leveraging private finance, promoting blended finance, implementing strategies for raising new and additional resources, and encouraging the private sector to invest in biodiversity, including through impact funds and other instruments;
- (d) Stimulating innovative schemes such as payment for ecosystem services, green bonds, biodiversity offsets and credits, and benefit-sharing mechanisms, with environmental and social safeguards;
- (e) Optimizing co-benefits and synergies of finance targeting the biodiversity and climate crises;
- (f) Enhancing the role of collective actions, including by indigenous peoples and local communities, Mother Earth centric actions¹³ and non-market-based approaches including community based natural resource management and civil society cooperation and solidarity aimed at the conservation of biodiversity;
- (g) Enhancing the effectiveness, efficiency and transparency of resource provision and use.

TARGET 20

Strengthen capacity-building and development, access to and transfer of technology, and promote development of and access to innovation and technical and scientific cooperation, including through South-South, North-South and triangular cooperation, to meet the needs for effective implementation, particularly in developing countries, fostering joint technology development and joint scientific research programmes for the conservation and sustainable use of biodiversity and strengthening scientific research and monitoring capacities, commensurate with the ambition of the goals and targets of the Framework.

TARGET 21

Ensure that the best available data, information and knowledge are accessible to decision makers, practitioners and the public to guide effective and equitable governance, integrated and participatory management of biodiversity, and to strengthen communication, awareness-raising, education, monitoring, research and knowledge management and, also in this context, traditional knowledge, innovations, practices and technologies of indigenous peoples and local communities should only be accessed with their free, prior and informed consent,

TARGET 22

Ensure the full, equitable, inclusive, effective and gender-responsive representation and participation in decision-making, and access to justice and information related to biodiversity by indigenous peoples and local communities, respecting their cultures and their rights over lands, territories, resources, and traditional knowledge, as well as by women and girls, children and youth, and persons with disabilities and ensure the full protection of environmental human rights defenders.

TARGET 23

Ensure gender equality in the implementation of the Framework through a gender-responsive approach, where all women and girls have equal opportunity and capacity to contribute to the three objectives of the Convention, including by recognizing their equal rights and access to land and natural resources and their full, equitable, meaningful and informed participation and leadership at all levels of action, engagement, policy and decision-making related to biodiversity.

Ethiopia's Updated National Biodiversity Strategy and Action Plan 2025-2030

Annex VIII. Estimated cost of implementation of the Eth. NBSAP 2025-2030 2025 through 2030

Eth_ 2025-2030 NBSAP Targets		Years of Implementation from 2025 through 2030						Total cost of implementation (USD)
S.N	Targets	Y1	Y2	Y3	Y4	Y5	Y6	
1	Eth -Target 1: By 2030, areas of biodiversity importance are spatially planned, effectively managed and increased from the existing 30% to 80%, addressing land-use changes with full participation of stakeholders	638,750.84	491,041.09	413,984.73	413,984.73	413,984.73	413,984.73	2,785,730.86
2	Eth - Target 2: By 2030, forest coverage is increased from 23.6% to 30%, area of degraded wetland decreased by 20% from the existing 27,142.5 km ² and degraded terrestrial land decreased by 20% from the existing 85, 243 km ² , extent of conversion of grazing land decreased from 43.7% to 30% through fostering ecosystem-based management approach, thereby ensuring at least 30% of the degraded land is restored.	57,453,567.59	51,440,964.07	59,396,308.92	48,396,308.92	58,396,308.92	57,397,196.80	332,480,655
3	Eth - Target 3: By 2030, ecologically representative protected areas including biosphere reserves and inland waters are increased from 12 to 30%, while the existing 0.08% ecosystem and species-based <i>in</i>	134,129.10	4,166,985.72	4,209,389.58	3,002,625.58	22,917,474.20	468,372.10	34,898,976.28

Ethiopia's Updated National Biodiversity Strategy and Action Plan 2025-2030

	<i>situ</i> sites are doubled through enhancing their ecological connectivity and effective management by actively engaging local communities.							
4	Eth - Target 4: By 2030, <i>in situ</i> conservation of agrobiodiversity is increased from 178 to 205 sites for conservation of crop varieties and animal breeds on farm, and management standards of the existing are improved.	42,668.03	229,706.33	181,463.31	165,455.90	162,696.00	145,005.05	926,994.61
5	Eth - Target 5: By 2030, <i>ex situ</i> conservation; emphasizing endemic, endangered, economically and ecologically important species of crop varieties of 92,258 accessions, 3,644 accessions of forest and rangeland plant species, 120,000 straws of animal breeds and 1,350 microbial species/strains are increased by 10%, 25%, 50%, and 10%, respectively; and standards of the existing <i>ex situ</i> conservation are improved.	11,177.59	402,572.55	348,961.53	261,679.75	140,244.23	140,244.23	1,304,879.87
6	Eth - Target 6. By 2030, proportion of areas invaded by invasive alien species reduced by 50% from the existing 3,949,314 ha through eradicating the existing invasions and preventing their introduction and expansion.	111,969.07	138,914.84	382,439.10	63,650,612.55	37,451.82	37,948.60	64,359,335.98

Ethiopia's Updated National Biodiversity Strategy and Action Plan 2025-2030

7	Eth - Target 7: By 2030, pollution of major ecosystems is reduced by at least 10% from the existing 10 million tones by application of innovative measures, with emphasis on municipal and industrial sources.	78,105.12	198,712.67	381,693.92	137,994.91	22,907.16	22,907.16	842,320.93
8	Eth - Target 8: By 2030, land-based mitigation and adaptation measures contribute to the reduction of at least 152.75 MtCO ₂ e from the BAU scenario of 346 MtCO ₂ e, and inter-sectoral coordination towards biodiversity mainstreaming in the climate actions is increased	292,549.31	786,571.26	745,172.77	689,974.79	683,075.04	500,921.70	3,698,264.86
9	Eth - Target 9: By 2030, unsustainable utilization of wild genetic resources is reduced ensuring that all uses, including harvesting and trading activities are implemented sustainably, safely and legally.	70,722.39	149,449.41	-	-	27,598.98	-	247,770.79
10	Eth - Target 10: By 2030, biodiversity issues are integrated into agricultural systems through application of biodiversity-friendly practices and use of improved decision support processes in agricultural production systems, where at least 25% of agricultural land is put under agro-ecological practices.	9,796,369	10,405,809	10,173,670	10,250,600	10,290,300	10,170,309	61,087,056

Ethiopia's Updated National Biodiversity Strategy and Action Plan 2025-2030

11	Eth - Target 11: By 2030, 75 urban centers put 30% of their land under spatially planned green areas through biodiversity-inclusive urban planning.	317,388	1,038,164	979,654	979,654	979,654	979,654	5,274,167
12	Eth - Target 12: By 2030, access to genetic resources for research and development of 294,616 crop and horticulture accessions, 5700 forest and rangeland plants accessions, 9,000 straws of semen of domestic animals, 620 accessions of microbial species/strains and 1500 access permits are increased by 32%, 18%, 67%, 17% and 55%, respectively and value addition and market linkage are carried-out for at least 18 biological commodities	16,559.39	235,419.32	216,100.03	191,260.95	155,382.27	83,624.92	898,346.87
13	Eth - Target 13: By 2028, biodiversity and ecosystem services related laws, including those associated with incentives are studied, reviewed and integrated into the national and local development policies, strategies and plans.	58,141.84	149,604.86	157,884.61	81,306.60	48,187.82	53,707.62	548,833.36
14	Eth - Target 14: By 2030, a system of regulation and guidelines formulated, integrated to tax and business laws and enforced to implement biodiversity compliance to off-set negative impacts of business activities on biodiversity.	127,341.70	235,529.77	106,366.59	167,452.35	116,283.67	91,996.68	844,970.77

Ethiopia's Updated National Biodiversity Strategy and Action Plan 2025-2030

15	Eth - Target 15: By 2028, biodiversity priorities and concerns are integrated into biosafety regulatory framework and capacity to regulate transaction of GMOs is enhanced.	88,316.74	338,860.30	59,282.61	44,158.37	-	-	530,618.03
16	Eth - Target 16: By 2030, capacity to implement biodiversity conservation, sustainable utilization and access and benefit sharing are improved by strengthening information technology, gene banks and laboratory infrastructures through technology transfer, and scientific and technical cooperation; including through South-South and North-South cooperation.	6,000,026.00	9,201,404	10,542,981.00	9,000,000	9,690,362	-	44,434,773.00
17	Eth - Target 17: By 2030, data, information and comprehensive knowledge and innovations related to biodiversity values, ecosystem functioning, status and trends are generated, and the consequences of biodiversity loss are determined, reviewed, compiled and made accessible to decision makers, practitioners and the public, and are applied in biodiversity related planning and decision-making processes.	110,395.93	440,038.17	544,362.32	73,413.29	60,717.76	-	1,228,927.48
18	Eth - Target 18: By 2030, gender equality and a gender-responsive approach for biodiversity actions	-	185,465.16	189,605.01	82,796.95	104,876.13	124,195.42	686,938.67

Ethiopia's Updated National Biodiversity Strategy and Action Plan 2025-2030

	are ensured through awareness, participation, and social inclusion of disability, youth, children, and other vulnerable groups, and the actions that the stakeholders can take to conserve and use biodiversity sustainably are improved.							
19	Eth - Target 19: By 2029, mobilization of financial resources from domestic sources required for effective implementation of the strategy by mandated sectoral institutions is increased at least by 57% and strategy is devised to secure additional funds from other internal and external sources.	-	177,737.44	474,150.51	55,197.96	55,197.96	55,197.96	817,481.85
Total		57,686,465.97	68,783,535.26	71,484,402.01	127,448,014.12	83,291,172.35	59,104,024.50	557,897,042

557,897,018.40

Annex VIX. Major entities involved in updating the Eth. NBSAP 2025-2030

1. Technical Team (TT) members and their institutions

No.	Name	Their intuitions	Roles in the TT
1	Dr. Misikire Tessema	Ethiopian Biodiversity Institute (EBI)	Project Coordinator
2	Dr. Abraham Assefa	EBI	Member and Secretary
3	Dr. Tamene Yohannes	EBI	Member
4	Dr. Kebu Balemie	EBI	Member
5	Ato Million Adane	EBI	Member
6	W/o Etifwork Zewdu	EBI	Member
7	Ato Damtew Etisa	EBI	Member
8	Ato Ermiyas Yeshitla	EBI	Member
9	Ato Tariku Geda	EBI	Member
10	Ato Seyoum Hailemariam	Ministry of Agriculture (MoA)	Member
11	Ato Getnet Nigussie	MoA	Member
12	Ato Gezhigne Hailemariam	MoA	Member
13	Ato Abduljelil Amenu	MoA	Member

Ethiopia's Updated National Biodiversity Strategy and Action Plan 2025-2030

14	Ato Wubshet Mengistu	Ministry of Planning and Development (MoPD)	
15	W/o Simret Terfe	MoPD	
16	Dr. Addissu Assefa	Ethiopian Wildlife Conservation Authority (EWCA)	Member
17	Ato Gebremaskel Gizaw	EWCA	Member
18	Ato Mitiku Geberemichael	EWCA	Member
19	Ato Kabtamu Girma	Ethiopian Forest Development (EFD)	Member
20	W/o Alemtsehay Ferede	EFD	Member
21	Ato Awoke Damte	Environmental Protection Authority (EPA)	Member
22	W/o Minitamir Melesse	EPA	Member
23	Dr. Debissa Lemessa	Addis Ababa University	Member
24	Ato Samual Bekele	Ministry of Urban Infrastructure	Member
25	Ato Yehenew Abebe	Ministry of Women and Social Affairs	Member
26	Ato Wassihun Legesse	Ethiopian Institute of Agricultural Research	Member
27	W/o Tinsae Mengistu	Ministry of Industry	Member
28	Ato Wondowosen Assefa	Ethiopian Statistical Service	Member
29	Ato Sori Chalchissa	Ministry of Mines	Member
30	Ato Tagel Hamza	Ministry of Watery and Energy	Member

31	W/o Genet Shewafera	Ministry of Finance	Member
32	Ato Bamlaku Andargie	Ministry of Justice	Member
33	Ato Abdeta Debela	BioDev 2030/IUCN	Member
34	Dr. Girma Teshome	Policy Studies Institute	Member
35	Ato Tesfaye Dagne	Space Science and Geo-spatial Institute	Member

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