GOVERNMENT OF THE FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA

SIXTH NATIONAL REPORT ON THE IMPLEMENTATION OF Et_NBSAP 2015-2020

December 2020
Addis Ababa, Ethiopia

Convention on Biological Diversity

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FOREWORD

The economic, social and environmental contribution of biodiversity is so vital to Ethiopia since it constitutes the major source of the livelihood for over 80% of the country's population in rural settings. Furthermore, biodiversity is the major source of raw material for construction, input for local industries, and contributes to export earnings. Its role in primary healthcare in the form of traditional medicine is also of paramount importance. Attributed to various direct and indirect pressures, however, the highly invaluable biological resources and associated systems of the country are being degraded at an alarming rate, thus calling for concerted efforts geared towards conservation and sustainable use of biodiversity and associated community knowledge.

Following the conclusion of the first National Biodiversity Strategy and Action Plan (NBSAP) in 2010, Ethiopia has revised its NBSAP to formulate and align the latest version, Et_NBSAP 2015-2020, as part of the execution of the Global Biodiversity Strategic Plan 2011-2020.

Formulation of Et_NBSAP 2015-2020 was primarily based on pillar issues including the level of threats the country's biodiversity has been facing, government priorities, existing capacity, lessons learned from the previous efforts in implementing NBSAP 2005-2010, and global provisions of the Strategic Plan for Biodiversity 2011-2020. With such premise, Ethiopia has set 18 National Biodiversity Targets which were implemented between 2015 and 2020.

This Report, therefore, presents the level of implementation of Et_NBSAP 2015-2020 of Ethiopia on target by target basis as well as its contribution to the success of specific Aichi Biodiversity Targets for the period 2015-2019. In addition, the Report outlines challenges encountered during the implementation period, lessons learned from the process, and critical issues that need to be taken into account while planning and implementing similar endeavors in accordance with the Post 2020 Biodiversity Framework.

I hope that this Report will help to give insights on the efforts made to conserve and sustainably use the country's biodiversity, and the dedication Ethiopia made to live up to its international commitments; and will constitute a valuable reference for similar future undertakings.

Fekadu Beyene (PhD), Professor
Commissioner, Environment, Forest and Climate Change Commission
December 2020

PREFACE

The 1992 Earth Summit depicted a shift in global attitudes and trends toward the environment particularly with respect to the perception, management and use of biological resources that have been recognized to be at stake. The fact that the depletion of natural resources that occurred in one country could have a reflective effect on the environment of other nations or the entire planet was properly grasped at the time. Accordingly, the Earth Summit devised plans to protect the environment by involving national and local governments and NGOs. The summit was tailored to promote a sustainable planet for future generations and established a UN Convention on Biological Diversity (CBD) as one of the three Rio conventions which intends to conserve and protect biodiversity and safeguard life on Earth, and which has entered into force in 1993. The Millennium Development Goals (MDGs), which was designed in 2000 by the United Nations was another important undertaking related to the CBD since one of its goals was ensuring environmental sustainability. However, lack of progress to meet commitments, inadequate resources, lack of focus and accountability, and insufficient interest in sustainable development hindered achievements of the MDGs as aimed.

In October 2010, after taking note of the report indicating that the 2002-2010 global biodiversity targets were largely unmet, Parties to the CBD have formulated a ten-year special strategic frame of actions. This was the 2011-2020 Strategic Plan for Biodiversity, that aimed at successful achievement of environmental sustainability and biodiversity conservation through formulation of National Biodiversity Strategy and Action Plan 2011-2020 (NBSAP 2011-2020). The NBSAP is the principal instrument for implementing the Convention at national levels in accordance with Article 6 of the CBD which was planned to define the status of biodiversity, the threats leading to its degradation and the strategies and priority actions to ensure biodiversity conservation and sustainable use within the framework of the socio-economic development of each country. Guided by this principle, Ethiopia has revised its NBSAP 2005-2010, developed Et_ NBSAP 2015-2020 and undertook its implementation. In line with Article 26 of the CBD that requires each Party to report the implementation of its NBSAP, Ethiopia has submitted a series of National Reports (2nd to 5th) providing comprehensive accounts of the efforts made and achievements of the national processes.

Et_NBSAP 2015-2020 consisted of five globally shared Goals, 18 National Targets, and 58 Actions. Ten key implementing agencies who have mainstreamed biodiversity issues into their own sectors took the lead in coordinating the overall implementation besides their role in implementing specific Targets. A National Expert Group which was established by pooling experts from key implementing agencies and other relevant

stakeholders, was in charge of collecting, analyzing and interpreting data as well as preparing the Et_NBSAP 2015-2020. The Ethiopian Biodiversity Institute, as an overall coordinator of the implementation, periodically formulated progress reports of implementation, facilitated validation sessions of National Biodiversity Technical Committee, coordinated the preparation of the National Report by National Task Force, and facilitated the endorsement of the Report by National Biodiversity Council that consisted of delegates from decision making bodies, governmental institutions and non-governmental organizations.

The outcomes of Et_NBSAP 2015-2020 indicated that Ethiopia has performed above average, implying satisfactory but still inadequate achievements. Accordingly, majority of the Targets have been achieved to the optimum; weaker achievement was registered in fewer Targets; while one target was underachieved. The gap in successfully achieving some of the Targets is closely linked to factors such as weak accountability among implementing agencies, lack of adequate budget, poor coordination among sectors, weak resource mobilization and limited awareness on biodiversity values and ecosystem services.

It is generally perceived that this National Report depicts germane clues and directions to policy makers, governmental institutions, and non-governmental organizations who are working in the area of biodiversity conservation; and may be used as input for future action in light of maintaining and enhancing better performances and paying proper attention to the low income groups. It is well agreed that biodiversity conservation and its sustainable use are not the responsibility of limited sectors, but requires collaborative effort by multiple stakeholders. Thus, institutions, policy makers, practitioners and the public at large will gain from the experience so far in terms of designing and implementing undertakings that relate to biodiversity in alignment with Post-2020 Global Biodiversity Framework with prospect of achieving the 2050 Vision of Living in Harmony with Nature.

It is my great pleasure to take this opportunity to acknowledge all Lead and Collaborating Implementing Agencies, the United Nations Environment Program, the Global Environment Facility, the National Biodiversity Council, the National Biodiversity Technical Committee and others who made their concerted efforts to the achievement of the reported level of Et_NBSAP 2015-2020. I would also like to thank the National Project Coordinator, the Sixth National Report Formulating Task Force, the Final Report Write-up team and the Editor for their dedication. My gratitude also goes to the CBD Secretariat for its overall guidance in the process of producing the Report.

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December 2020

ACRONYMS

ABS	Access and Benefit Sharing
ABTs	Aichi Biodiversity Targets
AnGRFA	Domestic Animal Genetic Resources for Food and Agriculture
AU-IBAR	African Union-Inter African Bureau for Animal Resources
CBD	Convention on Biological Diversity
CHM	Clearing House Mechanism
COP	Conference of the Parties
CRGE	Climate Resilient Green Economy
DAD-IS	Domestic Animals Diversity-Information System
EBF	Ethiopian Biodiversity Forum
EBI	Ethiopian Biodiversity Institute
EFCCC	Environment, Forest and Climate Change Commission
EWCA	Ethiopian Wildlife Conservation Authority
GEF	Global Environment Facility
HoPRs	House of People's Representatives
IPBES	Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services
M&E	Monitoring and Evaluation
MoA	Ministry of Agriculture
MoANR	Ministry of Agriculture and Natural Resources
MoE	Ministry of Education
MoEFCC	Ministry of Environment, Forest and Climate Change
MoF	Ministry of Finance
MoFED	Ministry of Finance and Economic Development
MInT	Ministry of Innovation and Technology
MoLF	Ministry of Livestock and Fisheries

MoSHE	Ministry of Science and Higher Education
MoST	Ministry of Science and Technology
MoWCA	Ministry of Women and Children's Affairs
MoWCY	Ministry of Women, Children and Youth
NBC	National Biodiversity Council
NBSAP	National Biodiversity Strategy and Action Plan
NBTC	National Biodiversity Technical Committee
NGOs	Non-governmental Organizations
PAs	Protected Areas
REDD+	Reducing Emissions from Deforestation and Forest Degradation
SCBD	Secretariat of the Convention on Biological Diversity

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EXECUTIVE SUMMARY

Ethiopia is a country of rich biodiversity and also a major center of origin and diversity, including endemism for several species. Although the Country is endowed with enormous biodiversity and varied ecosystems, the valuable biological resources and ecosystem services have been under threat due to pressures caused by natural and anthropogenic drivers. The existence of two of the world's 34 biodiversity hotspots, namely, the Eastern Afromontane and the Horn of Africa within Ethiopia's territory is a clear manifestation of the Country's wealth in terms of biological diversity as well confronted with the danger of depletion of its bio-physical system.

The progressive dwindling of biological diversity, associated community knowledge and ecosystem services, due to direct and indirect pressures, posed a significant threat that necessitated making joint efforts at the global scale. This led to the realization of one of the major environment-related agreements, the Convention on Biological Diversity (CBD), which was instrumental in facilitating an in-depth understanding of the problem, the designing of suitable institutional arrangements and formulation of appropriate strategies and action plans. The Global Strategic Plan for Biodiversity 2011–2020, which was developed with the intention of materializing efficient biodiversity conservation, its sustainable utilization, as well as fair and equitable sharing of benefit arising from the use of genetic resources is one among the different initiatives facilitated by the CBD. Ethiopia, complying with its commitment to implement decisions passed by the Convention, and cognizant of the benefits of implementing the Global Strategic Plan for Biodiversity 2011–2020 will bring, has revised and implemented its National Biodiversity Strategy and Action Plan, NBSAP (Et_NBSAP 2015-2020).

The NBSAP was revised following Decision X/2 of the Conference of the Parties made at Nagoya in October 2010; the decision, which is also referred to as "*The Strategic Plan for Biodiversity 2011-2020 and its Aichi Biodiversity Targets*". The revised version, Et_NBSAP 2015-2020, is comprised of 18 National Targets, 44 indicators and 58 actions. Each target had its specific rationale, implementation arrangements, milestones and indicators. A total of 10 lead implementing federal institutions were assigned to undertake and coordinate the implementation

of specific actions from the federal to the lowest district levels along their respective chain of command.

The implementation status of Et_NBSAP 2015-2020 was periodically evaluated through a process that culminated in compilation of the Sixth National Report in April 2019. In terms of scope, the Sixth National Report presents the implementation status of the revised Et_NBSAP 2015-2020 for the period between 2015 and 2019 which has been translated into the Aichi Biodiversity Targets 2011-2020, based on the pre-agreed map of the contribution of each National Target to one or more Aichi Biodiversity Targets of 2011-2020.

This Report contains six sections. **Section 1** introduces the biodiversity and associated systems of the country, the threats they are facing and the needs for revising the National Biodiversity Strategy and Action Plan and preparing the Sixth National Report to the Convention on Biological Diversity. **Section 2** presents issues that pertain to the Implementation Arrangements. It outlines the roles the Ethiopian Biodiversity Institute, as the National Focal Point, the National Biodiversity Technical Committee, and the National Biodiversity Council have played during the implementation phase and preparation of the Sixth National Report. **Section 3** portrays Goals, Targets and Corresponding Components of the Et_NBSAP 2015-2020. It contains the Rationale, Actions and Indicators of each National Target directly adopted from the Et_NBSAP 2015-2020. **Section 4** presents measures taken during the implementation of the Et_NBSAP 2015-2020 from 2015 to April 2019 as well as effectiveness of the measures, monitoring and evaluation techniques employed, major impacts that have been realized, and the contribution made to the achievements of the Aichi Biodiversity Targets. **Section 5** outlines challenges faced during the implementation and valuable lessons learned which could be used for better formulation and implementation of Post 2020 Biodiversity Framework. **Section 6** presents important conclusions and recommendations that could be used as inputs for future similar endeavors.

Regarding the level of implementation, the success varied from target to target. While the implementation level of actions under specific targets that were destined to be implemented by one or more distinct Directorates/Departments of the given lead implementing institution were more successful, the implementation level of those actions that were planned to be implemented

by inter-Directorate/Department coordination were weak or not satisfactory. This was because while actions assigned to specific Directorates/Departments had a better chance of being executed since they were incorporated into annual plans of implementing institutions that are supported by budget and the performance of which was evaluated periodically.

Actions under some targets were planned to be implemented by inter-Directorate/Department coordination, basically through financial resources that were supposed to be secured from external sources or by pooling resources from the implementing institutions. Nevertheless, although a financial request was made to the Secretariat of the Convention on Biological Diversity (SCBD) and the Global Environment facility (GEF), neither significant amount of finance was secured from external source as initially aspired nor sufficient finance was pooled internally. As a result, the implementation levels of those actions were determined to be unsatisfactory.

Overall, the implementation level of Et_NBSAP 2015-2020 could be judged as satisfactory since the achievement level of 10 of the total 18 National Targets (55.56%) is determined to be effective while that of 7 targets (38.89%) found to be partially effective. Similar to many other multi-stakeholder-based undertakings, the implementation of Et_NBSAP 2015-2020 has experienced challenges and, at the same time, valuable lessons were gained from the process, particularly for better formulation and implementation of Post 2020 Biodiversity Framework.

1. INTRODUCTION

Ethiopia is one of the mega-diverse countries in the world as its territory covers a big part of two of the world's 34 biodiversity hotspots, i.e. the Eastern Afromontane and the Horn of Africa. It is also recognized to be a major center of origin, diversity as well as endemism for several species. The Country has diverse topography with an enormous altitudinal variation ranging from 126 meters below sea level at Denakil Depression to 4,620 meters above sea level at Mount Ras Dashen. This, in turn, has resulted in wide differences in rainfall, humidity, temperature and associated variables that paved the way for formation of diverse ecological systems: Afroalpine and Sub-afroalpine, Montane Grassland, Dry Evergreen Montane Forest and Evergreen Scrub, Moist Montane Forest, Acacia-Commiphora Woodland, Combretum-Terminalia Woodland, Lowland Tropical Forest, Desert and Semi-desert Scrubland, Wetland, and Aquatic Ecosystems (according to the Ethiopian National Biodiversity Strategy and Action Plan 2015-2020 document). Furthermore, the natural settings as well as the cultural diversity are recognized to have contributed to the Country's enormous diversity, mainly through varied traditional farming practices that enhanced agro-biodiversity.

Although Ethiopia is endowed with such highly invaluable biological resources and associated community knowledge systems, these assets have been confronted with multitudes of natural and anthropogenic challenges, resulting in depletion of biological diversity as well as the ecosystems services rendered. As it is well recognized, such dwindling of the vital resources and associated benefits was a prerequisite for the emergence of a new perspective with regard to the perception, use and conservation of biological diversity at the global scale; and also planning extensive measures aspired to be implemented by all nations of the world. One such arrangement devised as a tool for enhancing effective conservation, sustainable use and development efforts was the Global Strategic Plan for Biodiversity 2011–2020. Ethiopia, being committed to implement the decisions passed by the Convention on Biological Diversity (CBD) and its protocols; has revised its National Biodiversity Strategy and Action Plan (Et_NBSAP 2015-2020) for implementation.

The basis for development of NBSAPs is Article VI of the CBD, while its revision was made as per Decision X/2 of the Conference of the Parties (COP) at Nagoya in October 2010. The decision, which is also referred to as "*The Strategic Plan for Biodiversity 2011-2020* calls for

effective implementation of the Convention through strategic approach comprising of a shared Vision, Mission and Goals as well as Aichi Biodiversity Targets (ABTs). Ethiopia, as signatory to the CBD and with its acknowledged exemplary commitment to realize its objectives, has first developed the National Biodiversity Strategy and Action Plan in 2005 which was revised in 2015.

The revised Ethiopian NBSAP (Et_2015-2020) is comprised of 18 National Targets, 44 Indicators and 58 Actions. Each target, in turn, consisted of specific rationale, implementation arrangements, milestones and indicators as specific component. For each action, lead implementing institutions as well as collaborating institutions or sectors were designated and implementation time-frame was set. Accordingly, a total of 10 lead implementing federal institutions were assigned to undertake and also coordinate the implementation of specific actions from the federal to the district levels along their respective operational hierarchy.

The implementation status of the Et-NBSAP 2015-2020, that has been translated into the Aichi Biodiversity Targets 2011-2020 (Annex I) based on the pre-agreed map of the contribution of each national target to one or more Aichi Biodiversity Targets of 2011-2020, was reported on-line to the CBD as the Sixth National Report in April 2019. The Report covers the implementation of the revised Et_NBSAP 2015-2020 for the period between 2015 and 2019. It is organized in a format to be issued in print form for wider circulation and better archiving, and comprises of the contents of the Sixth National Report as submitted to the CBD, Key Messages from concerned heads of institution and other relevant information.

2. IMPLEMENTATION ARRANGEMENT

The Ethiopian Biodiversity Institute (EBI) is a primary national entity in charge of implementing and coordinating undertakings that pertain to conservation and sustainable utilization of biodiversity as well as ensuring fair and equitable sharing of benefits arising from the use of genetic resources and associated community knowledge. EBI is the National Focal Institute to the Convention on Biological Diversity (CBD), and hence is responsible for the overall coordination of the implementation of the National Biodiversity Strategy and Action Plan 2015 - 2020 (Et_NBSAP 2015-2020). In line with this, EBI facilitated the establishment of the National Biodiversity Council (NBC) and the National Biodiversity Technical Committee (NBTC). In connection with implementation of Et_NBSAP 2015-2020 and follow-up of the process, EBI had organized biannual and annual meetings of the NBC and the NBTC; and facilitated evaluation of the level of progress throughout the implementation period on target by target basis vis-à-vis the plan. The detailed coordination mechanism, resource mobilization, communication scheme, and follow-up process are presented below.

2.1. Coordination Mechanism

The National Biodiversity Council (NBC) is the highest body that was responsible to provide strategic directions and oversee the overall implementation processes of the Et_NBSAP 2015-2020. The NBC was composed of members from the House of People's Representatives (HoPRs), Ministry of Agriculture and Natural Resources, MoANR, and Ministry of Livestock and Fisheries, MoLF, (both merged to form the current Ministry of Agriculture, MoA), Ministry of Environment, Forest and Climate Change (MoEFCC, the present Environment, Forest and Climate Change Commission, EFCCC), Ministry of Science and Technology (MoST, the current Ministry of Innovation and Technology, MInT), Ministry of Education (MoE), Ministry of Science and Higher Education (MoSHE), Ministry of Women and Children's Affairs (MoWCA, the present Ministry of Women, Children and Youth, MoWCY), Ministry of Finance and Economic Development (MoFED, the present Ministry of Finance, MoF), Ethiopian Biodiversity Institute (EBI), Ethiopian Wildlife Conservation Authority (EWCA), representatives from local and international NGOs (one from each) and National Chamber of Commerce. The chairperson of the NBC was the Commissioner of EFCC (former MoEFCC) and the vice chairperson was the chair of the Agriculture, Pastoralist and Environmental Protection

Affairs Standing Committee of the HoPRs while the Director General of EBI has served as secretary of NBC.

The National Biodiversity Technical Committee (NBTC) was a technical wing that was mandated to follow-up the implementation of the Et_NBSAP 2015-2020. NBTC consisted of members from Lead Implementing Agencies, Ethiopian Biodiversity Forum (EBF), Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), National Chamber of Commerce, local and international NGOs, former Ministry of Information and Communication and Biodiversity Units of Regional States and Dire Dawa City Council. The Chairperson of the NBTC was Deputy Director General of EBI, the vice chairperson was elected from among members of the NBTC, and the coordinator of the Et_2015-2020 served as the secretary.

In accordance with its mandate, the NBTC was responsible to monitor and evaluate the progresses of the implementations of the Et_NBSAP 2015-2020, approve various strategies such as communication, education and public awareness; financial resources mobilization reporting formats and other activities in compliance with the instruction from the NBC, as necessary.

As per the activity details stated above, the regular annual and several other urgent meetings of the NBC were held and through these the Committee listened and reviewed summary reports by EBI annually, assessed the status of implementation of the Et_NBSAP 2015-2020, and evaluated the levels of achievement of the NBSAP on a target-by-target basis. By assessing performance levels, gaps and challenges; the NBC gave strategic directions with regard to resource mobilization, stakeholder's commitment and monitoring and evaluation in order to enhance implementation of the Et_NBSAP 2015-2020.

Similarly; the NBTC, through its biannual and additional urgent meetings, evaluated the progress of implementation of the Et_NBSAP 2015-2020, based on the performance of reports of the Lead Implementing Agencies; compiled biannual reports that were presented to the NBC; and received feedbacks from the NBC that has been relayed to respective Lead Implementing Agencies for further action.

2.2. Resource Mobilization

The Et_NBSAP 2015-2020 National Targets and their respective actions were planned to be implemented through two financing mechanisms; i.e., budget allotted by the national government, finance mobilized from local and international sources. Accordingly, actions were mainstreamed into sectoral and cross-sectoral plans for implementation by the national budget. Although Ethiopia has presented its financial requirements, target by target basis for the period 2015 to 2020 to the Secretariat of the Convention on Biological Diversity (SCBD) and Global Environmental Facility (GEF), as per the direction put forward by the SCBD, the support granted from the external sources did not meet the expectation and remained meager to accomplish the targets as planned. Similarly, it was not possible to generate finance from private sectors.

2.3. Clearing House Mechanism

Parties required to establish a Clearing House Mechanism (CHM) through COP Decision I/3 as an essential tool for communication and information exchange to promote and facilitate scientific and technical cooperation. Consistent with this, the national CHM was updated and a network of national stakeholders and CHM (including ABS-CHM and Biosafety-CHM) were established, on the onset of the implementation period; and used to facilitate communication on the implementation.

2.4. Monitoring and Evaluation

The monitoring and evaluation (M&E) task was carried, based on the developed formats and work plan. The M&E was done mainly through evaluation of quarterly and annual reports, questionnaire-based surveys, formal and informal discussions with the local communities, consultation with decision makers and ground-truthing using field visits.

Among the M&E tools specified above, reporting turns to be the major instrument employed. According to the agreed plan outlined in the Et_NBSAP 2015-2020, Lead Implementing Agencies and Biodiversity Units of Regional States were expected to submit their respective implementation progress reports to EBI on quarterly basis. However, the reports were submitted to EBI on biannual basis, mainly from Lead Implementing Agencies. The reports received were compiled by EBI and presented to the NBTC during its biannual meetings.

Subsequently, the NBTC enriched the reports and it was then presented to the NBC. Following the annual NBC meetings, EBI provided feedbacks (i.e., regarding the presented reports by Lead Implementing Institutions, observed lags and future directions provided by NBC) to the Lead Implementing Agencies after the NBC meetings.

3. GOALS, TARGETS AND CORRESPONDING COMPONENTS

The Ethiopian National Biodiversity Strategy and Action Plan (Et_NBSAP 2015-2020) has five globally shared Goals. The number of National Targets, and corresponding indicators and actions are presented in Table 1. Table 2 presents the Rationale, Actions and Indicators of each National Target directly adopted from Et_NBSAP 2015-2020 document to facilitate comprehension about the level of implementation outlined in Section 4.

Table 1. Goals, National Targets, Actions and Indicators of the Et_NBSAP 2015-2020

No.	Goals	National Targets (No)	Indicators (No)	Actions (No)
1	Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society	3	8	12
2	Reduce the direct pressures on biodiversity and promote sustainable use	3	6	10
3	Improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity	3	10	12
4	Enhance the benefits to all from biodiversity and ecosystem services	4	9	12
5	Enhance implementation through participatory planning, knowledge management and capacity building	5	11	12
Total	5	18	44	58

Table 2. Goals, Targets and the Corresponding Major Components of the Et_NBSAP 2015-2020

Strategic Goal A: Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society

Target 1: By 2020, awareness of public and decision makers on the values of biodiversity and ecosystem services is raised, and the steps they can take to conserve and use them sustainably is improved

Rationale	Planned actions for implementation	Indicators
In Ethiopia, local communities and most decision makers have limited knowledge and awareness on biodiversity and ecosystem services. Policy makers are occupied with poverty reduction and development issues that may have short term gains, but may harm biodiversity in the long term. Similarly, some of the investment activities may have adverse effects on biodiversity. Ethiopia has also been undertaking various actions in areas related to education and public awareness on biodiversity conservation and sustainable utilization. Therefore, further efforts are required to increase overall awareness of communities, policy makers, development partners and private sectors on the importance of biodiversity and ecosystem services. In addition, there is a high need to raise awareness at different levels in order to bring positive changes and to create more commitment of government for effective implementation of the three standing objectives of the Convention on Biological Diversity.	1.1. Conduct national baseline survey on the level of awareness of the public and decision makers on biodiversity 1.2. Conduct awareness raising activities on biodiversity for the public and decision makers 1.3. Revise educational curricula relevant to biodiversity 1.4. Start implementation of the revised educational curricula 1.5. Make awareness raising part of the extension and adult education program 1.6. Evaluate the level of awareness of public and decision makers on biodiversity.	• Percentage of the public and decision makers aware of biodiversity and ecosystem services • Percentage of decision makers addressing the sustainability agenda • Percentage of the public participating in caring biodiversity and environment.

Target 2. By 2020, the existing biodiversity related laws, regulations and strategies, including those associated with incentives are reviewed and the identified gaps are addressed

Rationale	Planned actions for implementation	Indicators
Lack of harmonization of laws, regulations and strategies, perverse incentives and absence of regulations and guidelines in some areas of biodiversity have resulted in loss of the same. Therefore, there is a need to review and fill the gaps of the existing laws, regulations and strategies, and formulate new ones, as appropriate. Moreover, there is a need for capacity building that will enable the enforcement of the existing legal frameworks.	2.1. Review laws, regulations and strategies related to biodiversity, including those associated with incentives 2.2. Draft/harmonize laws, regulations and strategies related to biodiversity 2.3. Approve and mainstream laws, regulations and strategies 2.4. Build capacity on the implementation of the existing biodiversity related laws, regulations and strategies	• Number of revised laws, regulations and strategies • Number of identified incentives that reward positive contributions and addressed perverse incentives • Number of mainstreamed laws, regulations and strategies • Number of stakeholder institutions for whom capacity was built.

Target 3. By 2020, biodiversity values and ecosystem services are communicated and integrated into national and local development and poverty reduction strategies and plans

Rationale	Planned actions for implementation	Indicators
Like in many other developing countries, the importance of biodiversity, especially of ecosystem services are not widely reflected in decision making processes in Ethiopia, resulting from the absence of reliable and comprehensive data on economic and non-economic values of biodiversity and the ecosystem services it underpins. Therefore, there is a need to ensure the diverse values of biodiversity and opportunities derived from its conservation and sustainable use so that these are recognized and reflected in all relevant public and private decision-making processes such as national and local development and poverty reduction strategies.	3.1. Review studies on valuation of biodiversity and ecosystem services 3.2. Communicate and integrate values of biodiversity and ecosystem services into local and national development and poverty reduction strategies and plans	• Strategies integrating values of biodiversity and ecosystem services

Strategic Goal B: Reduce the direct pressures on biodiversity and promote sustainable use

Target 4. By 2020, habitat conversion due to expansion of agricultural land is halved from the existing rate of about 10% per year

Rationale	Planned actions for implementation	Indicators
Habitat conversion is one of the major factors of biodiversity loss in Ethiopia. Rising demands for food and other agricultural products, among others, have resulted in clearing of natural habitats for agricultural lands; and economic, demographic and social pressures are likely to put further pressure on habitats. Therefore, there is an urgent need to decrease the rate of such expansion into forest and other ecosystems. Projections indicate, for example, that unless appropriate measures are in place to change the traditional development path, an area of 9 million ha might be deforested for agriculture between 2010 and 2030. Over the same period, annual fuel wood consumption will rise by 65%, leading to additional forest degradation to generate more than 22 million tons of woody biomass. Moreover, both federal and regional government policies and laws are silent regarding wetland protection. As a result, many ecosystems such as wetlands and high forests have been converted to farmlands and drylands progress to desertification, and there is an urgent need to prevent the losses of these ecosystems and the encompassed biodiversity.	4.1. Create alternative jobs for local communities 4.2. Increase alternative energy sources and use of energy efficient technologies 4.3. Adopt technologies and innovations for increased productivity of smallholder farmers and pastoralists	• Rate of annual conversion of habitats into agricultural land

Target 5. By 2020, unsustainable utilization of biodiversity and ecosystem services are reduced

Rationale	Planned actions for implementation	Indicators
Unsustainable utilization of biological resources is one of the major threats to biodiversity in Ethiopia; contributing to degradation of rangelands, forest ecosystems, wetlands and aquatic ecosystems. Therefore, sustainable land and water resource management is required to achieve biodiversity conservation and sustainable utilization.	5.1. Develop and implement regulations and guidelines to control open access to grazing lands, aquatic ecosystems, wetlands and other communal lands 5.2. Improve productivities of forage, grazing and rangelands	• Number of ecosystems and species/breeds managed sustainably • Number of ecosystems restored

	5.3. Ensure sustainable use of natural fish stock, applying ecosystem-based management, and expanding aquaculture 5.4. Promote afforestation and use of non-wood forest products	

Target 6. By 2020, the area invaded by invasive species is reduced by 75% and measures are in place to regulate and monitor invasive species, including newly emerging ones

Rationale	Planned actions for implementation	Indicators
Invasive species are threats to biodiversity and ecosystem services. Invasive species are spreading rapidly into farm lands, aquatic ecosystems and rangelands of Ethiopia, causing loss of biodiversity, reductions in crop, fish and forage yields. They are displacing indigenous species of natural ecosystems. Though the extent of these damages has not been well documented, they are threatening food security, livelihoods, and human and animal health. Hence, they need to be controlled and eventually eradicated.	6.1. Status, trends and impacts of major invasive species: *Prosopis juliflora, Parthenium hysterophorus, Eichhornia crassipes* (Water hyacinth), *Lantana camara, Dactylopius coccus* (Cochineal insect and others), and revise their control strategy 6.2. Implement the revised strategies to control major invasive species 6.3. Put in place and implement measures to regulate and monitor invasive species, including newly emerging ones	• Area cleared from invasive species and properly managed • Trends in expansion of invasive species • Measures for monitoring invasive species

Strategic Goal C: To improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity

Target 7. By 2020, area coverage of ecologically representative and effectively managed PAs is increased from 14% to 20%

Rationale	Planned actions for implementation	Indicators
Well governed and effectively managed protected areas (PAs) are proven methods for safeguarding both habitats and populations of species and for delivering important ecosystem services. About 14% of the country's area is designated as PA. However, most of the PAs do not have legal status, and are inadequately protected and this is more pronounced on wetlands and water bodies. There is a need to increase the coverage of PAs, with due attention to their ecosystem representation as well as effectiveness in terms of management. Lack of law	7.1. Identify gaps in the level of representativeness of the existing PAs 7.2. Establish ecologically representative PAs 7.3. Re-demarcate 11 of the PAs with no management plans and develop management plans for seven of the PAs 7.4. Conduct economic valuation for seven PAs	• Percent increase in area coverage of ecologically representative PAs • Percentage of properly managed PAs

enforcement, facility and infrastructure, absence of networks between PAs and wildlife corridors, substandard coordination, and weak capacity and low awareness at different levels are some of the problems that need to be addressed in this Target. Economic valuation on PAs is another issue that needs to be addressed to realize the Target.

Target 8. By 2020, *ex situ* conservation of agro-biodiversity, wild plants, animals and microbes; with special emphasis on endemic, endangered, economically or ecologically important species, and breeds is increased and standards of the existing *ex situ* conservation are improved

Rationale	Planned actions for implementation	Indicators
The diversity of crops and their wild relatives, animals, forest and rangeland plants and microbial genetic resources have been contributing to the national economy and local livelihood improvements of Ethiopian communities. However, they are declining due to direct and indirect pressures. In the face of climate change and outbreaks of emerging diseases and pests, conserving these resources provides future food security options for the country. The *ex situ* conservation activities are inadequate and encountering different management problems. Thus, strengthening the *ex situ* conservation of agro-biodiversity, forest and rangeland plants, animals and microbes; with special emphasis to endemic, endangered and economically or ecologically important species and breeds is the central focus of the Target.	8.1. Identify threatened species of agro-biodiversity, wild plants, animals and microbial genetic resources, and set priority for collection and conservation 8.2. Establish Natural History Museum and National Herbarium 8.3. Increase *ex situ* collections of species/breeds/strains and accessions/straws from: • 62 species to 99 species (76,521 to 80,571 accessions) of field and horticultural crops • 714 species to 1,214 species (1,704 to 4,746 accession) for forests and rangeland plants • Five breeds/species to eight breeds/species (32,600 straws to 132,600 straws) for domestic and wild animals • 550 to 1000 species/strains of microbes 8.4. Increase the number of botanical gardens from three to 10 sites 8.5. Identify gaps in and improve the standards of *ex situ* conservation	• Number of ecologically representative *ex situ* conservation sites • Number of species/breeds under *ex situ* conservation • Number of *ex situ* conservation sites to which standard conservation practices have been developed • A Natural History Museum and Herbarium established • Number of botanical gardens

Target 9. By 2020, *in situ* conservation sites for important species and breeds are increased and the standard of the existing *in situ* conservation are improved

Rationale	Planned actions for implementation	Indicators
The diversity of crops and their wild relatives, animals, forest and rangeland plants and microbial genetic resources have been contributing to the national economy and local livelihood improvements of the communities. However, they are declining due to direct and indirect pressures. In the face of climate change and outbreaks of emerging diseases and pests, conserving these resources provides future food security options for the country. The *in situ* conservation activities are inadequate and encountering different management problems. Thus, strengthening the *in situ* conservation of agro-biodiversity, forest and rangeland plants, animals and microbes; with special emphasis to endemic, endangered and economically or ecologically important species and breeds is central to the Target.	9.1. Identify threatened species and sites/ecosystems and set priority for *in situ* conservation 9.2. Increase the number of *in situ* conservation from: • 14/19 to 24/69 species/varieties of field and horticultural crops • 600 to 1000 species for forest and rangeland plants • 15 to 36 breeds/species of animals 9.3. Develop management plans for *in situ* conservation	• Number of *in situ* conservation sites • Number of species/breeds under *in situ* conservation • Number of *in situ* conservation sites in which standard conservation practices have been developed

Strategic Goal D: Enhance the benefits to all from biodiversity and ecosystem services

Target 10. By 2020, the contribution of biodiversity and ecosystem services, including climate change adaptation and mitigation, is improved through increasing forest cover from 15% to 20% of the country, increased designated total area of wetlands from 4.5% to 9.0% and doubling the area of restored degraded lands

Rationale	Planned actions for implementation	Indicators
Conservation, restoration and sustainable utilization of forests and rangelands, woodlands, wetlands and other ecosystems and the plants found in there are the means to sequester carbon dioxide and reduce the effect of greenhouse gases. Therefore, maintaining these ecosystems helps to ensure the continuation of carbon sequestration as well as many other ecosystem services. Restored ecosystems can have improved resilience and can contribute to climate change adaptation and generate additional benefits for the people, in particular local communities.	10.1. Increase forest cover from 15% to 20% through afforestation and re-forestation 10.2. Double area of designated wetlands 10.3. Increase restored area of degraded land from 10 to 20 million hectares 10.4. Generate incentives for the local communities through carbon trade from high forests, woodlands and traditional agro-forestry	• Percent increase in forest cover • Percent increase in designated wetlands • Percent increase in restored degraded areas

Target 11. By 2020, the number of genetic materials accessed for research and development, and fair and equitable sharing of benefits arising from their use are increased by 24% and 39%, respectively

Rationale	Planned actions for implementation	Indicators
The concept of Access to Genetic Resources and Fair and Equitable-sharing of Benefits arising from their use (ABS) emerged during the negotiations on the Convention on Biological Diversity in Rio de Janeiro, 1992. Due to limited capacity and lack of effective enforcement and follow-up mechanisms on the ABS, the government of Ethiopia and the local communities have not been adequately benefiting from access to their genetic resources. This has contributed to the degradation of the country's biodiversity. Therefore, concerted efforts are required to maximize benefits from access to potential genetic materials.	11.1. Build material and human capacity for bio-prospecting and negotiation 11.2. Promote and increase the number of genetic materials for research and development from 163,834 to 203,926 accessions and bio-prospected species for access and fair and equitable benefit sharing from their use from 13 to 18 species 11.3. Control unauthorized movement of genetic resources	• Number of genetic materials accessed for research and development • Number of genetic materials accessed for fair and equitable benefit sharing

Target 12. By 2020, women's access to and control over biodiversity resources and ecosystem services are improved

Rationale	Planned actions for implementation	Indicators
The government of Ethiopia doesn't discriminate citizens on the basis of gender, but in practice gender imbalance exists in areas of biodiversity conservation and sustainable use. Biodiversity conservation cannot be sustained without the involvement of different sectors of the society. Women are the primary stewards and promoters of biodiversity. However, they don't have equal rights with their men counterparts in using what they have conserved. There is also lack of clear guideline that helps to mainstream gender into biodiversity conservation and management.	12.1. Generate baseline data on the level of women's access to and control over biodiversity resources and ecosystem services 12.2. Develop and implement national gender mainstreaming guideline on biodiversity resources and ecosystem services 12.3. Evaluate the level of improvement of women's access and control over biodiversity resources and ecosystem services	• Percent of women's access to and control over biodiversity resources and ecosystem services • National gender mainstreaming guideline

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Target 13. By 2018, benefits from biodiversity are increased through value addition to at least 12 agro-biodiversity species and products, and creating market linkages for five species of medicinal plants; taking into account the needs of women and local communities		
Rationale	**Planned actions for implementation**	**Indicators**
Smallholder farmers and pastoralists are generators and custodians of biodiversity. Nevertheless, biodiversity is in danger of disappearing. Finding niche markets for selected species and their products is one possible way of ensuring the survival of biodiversity and enabling people who conserve them to earn more. These can be achieved through searching local, national and international markets and enhancing information on the marketing channels to increase the value of genetic resources. Although value addition and finding niche markets have been initiated for some agro-biodiversity products, most communities have not yet benefited. Thus, value addition and finding niche markets will be strengthened	13.1. Conduct value addition activities for at least 12 agro-biodiversity species and products (tef, enset, wheat, coffee, sesame, haricot bean, black cumin, barley, soya bean, chick pea, meat and milk), including studying their value chains, taking into account geographic origins 13.2. Create linkage to potential niche markets for the value added agro-biodiversity species and products and five species of medicinal plants *(Hibiscus sabdariffa, Moringa stenopetala, Withania somnifera, Embelia schimperi and Podocarpus falcatus)*	• Number of value added products • Number of newly established market links

Target 14. By 2020, stakeholders' integration, including the participation of local communities in biodiversity conservation and sustainable utilization, is strengthened		
Rationale	**Planned actions for implementation**	**Indicators**
Stakeholders working in the areas of biodiversity conservation and sustainable utilization in Ethiopia lack integration and collaboration in their activities. Apart from sporadic consultation at project/program initiation phases, many stakeholders working in the same area also lack interest to fully engage local communities. These, together with the poor institutional setups, make efforts inefficient and uncoordinated in the sector. As a result, efforts that have been made	14.1. Put in place National Biodiversity Council and National Biodiversity Technical Committee 14.2. Establish and strengthen 10 Biodiversity Units at regions and seven Centers at representative bio-geographical areas	• Level of local communities and stakeholders' participation • Level of NBSAP implementation

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so far remained unsuccessful in reducing the loss of biodiversity and ecosystem services.		
Target 15. By 2017, national biodiversity information system is strengthened, information dissemination strategy is devised and Clearing House Mechanism is updated		
Rationale	**Planned actions for implementation**	**Indicators**
Weak information exchange mechanisms and strategies among the stakeholders are affecting the effectiveness of conservation and sustainable utilization of biodiversity in Ethiopia. Thus, strengthening information exchange mechanisms including information dissemination and updating of the Clearing House Mechanism (CHM) are basic to implement this Target.	15.1. Update Clearing House Mechanism (CHM) and establish ABS-CHM 15.2. Establish and strengthen national biodiversity database and dissemination strategy 15.3. Devise information networking strategies	• Biodiversity Database • Status of CHM and ABS-CHM
Target 16. By 2020, knowledge and innovations related to biodiversity values, ecosystem functioning, status and trends, and the consequences of its loss are generated, reviewed, compiled and applied		
Rationale	**Planned actions for implementation**	**Indicators**
In Ethiopia, there is no sufficient information on values of biodiversity and ecosystem services. The status, trends and consequences of biodiversity loss are also not well studied. Therefore, there is high need to compile the exiting information and generate new knowledge in order to identify the status, tends, threats and determine values, and set priorities for conservation and sustainable utilization. Full implementation of this Target will also contribute to the achievements of the other targets outlined in the Et_NBSAP 2015-2020. Effective implementation of the Target will also strengthen the policy-science integration through improved access to information.	16.1. Conduct research on status, trends and threats to biodiversity and implementation of ABS-related issues 16.2. Apply generated knowledge and innovations for development and further research 16.3. Conduct valuation studies on at least six species/varieties of field and horticultural crops, five breeds/species of animals and two forest and rangeland ecosystems	• Number of compiled knowledge and innovations on biodiversity • Number of generated knowledge and innovations on biodiversity • Number of knowledge and innovations applied in biodiversity conservation and sustainable use

Target 17. By 2020, community knowledge, innovations and practices of local communities related to biodiversity are documented, subject to the national legislation, and relevant international obligations, and integrated into the national development strategies with the full and effective participation of local communities	
Rationale	**Planned actions for implementation**	**Indicators**

Rationale	Planned actions for implementation	Indicators
Ethiopia is a country of more than 84 nationality groups, inhabiting different agro-ecological zones. Their interaction with diversified biophysical environments has resulted in diverse community knowledge related to biodiversity. Nevertheless, the community knowledge has not been well documented and integrated in biodiversity conservation and sustainable utilization endeavors. Moreover, the knowledge has not been integrated into national development and poverty alleviation strategies. Therefore, further efforts are required to document knowledge, innovations and practices of local communities. There is also a need to integrate and apply the full knowledge into national development strategies, with the full participation of local communities.	17.1. Review, document and communicate existing knowledge, innovations and practices of local communities relevant to biodiversity 17.2. Integrate knowledge, innovations and practices of local communities relevant to biodiversity into national and local development strategies	• Number of documented community knowledge, innovations and practices • Number of community knowledge, innovations and practices integrated into local and national development strategies

Target 18. By 2020, mobilization of financial resources from internal and external sources required for effective implementation of the strategy is increased substantially		
Rationale	**Planned actions for implementation**	**Indicators**
One of the major hindrances in the implementation of the previous NBSAP was limitation in financial resources. The government of Ethiopia is highly committed to support biodiversity conservation and sustainable utilization endeavors. In light of multiple challenges biodiversity and ecosystems are facing, however, the financial resources from the government alone would not support full implementation of the current Strategic Plan. Therefore, mobilization of substantial amount of internal and external funds is critically required to effectively implement the Et_NBSAP 2015-2020.	18.1. Develop competent projects for seeking funds 18.2. Put in place financial resources mobilization strategy	• Amount of funds secured • The level of implementation of the NBSAP

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4. LEVEL OF IMPLEMENTATION OF THE Et_NBSAP 2015-2020

In this section, measures taken during the implementation of the country's National Biodiversity Strategy and Action Plan (Et_NBSAP 2015-2020) as well as their effectiveness are described. In the description, besides the details of measures taken and effectiveness of the measures, monitoring and evaluation techniques employed and major impacts that have been realized as well as the contribution made to the achievements of the Aichi Biodiversity Targets are included.

Pictorial description of progress towards the levels of implementation of each National Biodiversity Target, and the status of the progress of targets as evaluated in 2019 (Table 3), are also included in the section.

Table 3. Status indicator symbols and description of the status of achievements

Status symbol	Description on status of progress towards target	Achievement level	National Targets at achievement category	Total
	On track or exceeding to achieve target	Effective or beyond the expectation	2, 4, 7, 8, 9, 10, 11, 14, 15, 16	10
	Progress towards target, but at an insufficient level	Partially effective	1, 3, 5, 12, 13, 17, 18	7
	No significant overall progress	Not effective	6	1

Strategic Goal A: Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society

Target- 1: By 2020, awareness of public and decision makers on the values of biodiversity and ecosystem services is raised, and the steps they can take to conserve and use them sustainably is improved

Several measures have been taken to raise awareness of the public and decision makers in the country. Prior to taking awareness raising measures, a national baseline survey on the level of awareness of the public and decision makers was conducted in some sectors (e.g. a baseline survey was carried-out before the wildlife outreach programs were launched). The main measures taken to contribute to the implementation of the country's national biodiversity strategy and action plan and raise awareness of the public and decision makers included mass media (electronic and print media); face to face conservation education around Protected Areas (PAs); establishment of biodiversity forums in selected schools, universities and communities; and visits by target groups to selected PAs. Furthermore, events organized to facilitate experience and information sharing among local communities, observing/marking important international events such as the Environment, Biodiversity, Wildlife and Migratory Birds Days; and conducting various biodiversity related workshops, exhibitions, symposiums and conferences were important undertakings that contributed to implementation of the Target.

Additional measures that have been taken by different sectors include: Establishment of Nature Clubs in schools across the country; mass mobilizations on PAs management, conducting soil and water conservation measures, as well as integration of awareness raising issues as part of the extension and adult education programs in the agriculture and environment sectors. Furthermore, educational curricula relevant to biodiversity were revised by the formal education sectors. Some new biodiversity-oriented programs were launched in Higher Learning Institutions. With the aim of enhancing law enforcement and protection, wildlife conservation-related courses were included in the National Police College Training Programs.

The assessment of effectiveness of the implementation measures taken to achieve the desired outcomes showed that the progress made towards achieving the Target was at an insufficient rate

and thus was partially effective (Table 3). To assess the effectiveness of measures taken to implement the Target, monitoring and evaluation, feedbacks obtained through questionnaires, annual reports, field visit and surveys, formal and informal discussion with local communities, consultations with decision makers, published papers and revised/developed legal frameworks were some of the tools and methodologies used.

The main impacts of major interventions are demonstrated at different institutional levels and communities. For example, there have been changes related to policies and institutional structures in a manner that accommodates biodiversity conservation and sustainable use. Major biodiversity-related sectors of the country are reviewing their legal frameworks, and this indicates that there is a considerable change in the level of awareness. There are also some sectors that are willing to pay for ecosystem services (development of a legal framework for implementation is underway), and this implies a positive attitude towards enhancing biodiversity conservation and sustainable use. The effectiveness of measures taken in this Target has contributed to the achievement of Aichi Biodiversity Targets: 1 (Awareness of Biodiversity Values), 2 (Integration of Biodiversity Values), 4 (Use of Natural Resources) and 19 (Biodiversity Knowledge).

Target- 2: By 2020, the existing biodiversity related laws, regulations and strategies, including those associated with incentives are reviewed and gaps are addressed

Various measures have been taken to review and address the gaps in the existing biodiversity related laws, regulations and strategies including those associated with incentives. These include the Water Resources Policy and Strategy; Wildlife Development, Protection and Utilization Policy; Wildlife Development, Protection and Utilization Proclamation; Forest Development, Conservation and Utilization Proclamation; and harmonization of the ABS Law with the Nagoya Protocol.

Similarly, national policies, strategies, laws, regulations and action plans including National Biodiversity Policy, National Wetland Policy, National Invasive Alien Species Policy, Integrated National Land Use Policy and Plan and the Gaps Analysis of Wildlife Legal Frameworks are being drafted or harmonized. Moreover, various capacity building activities on biodiversity and

environment related laws were carried out including trainings on Cartagena Protocol, International Negotiation, and environmental protection and climate change issues.

The assessment of effectiveness of the implementation measures taken to achieve the desired outcomes showed that the progress made towards achieving the Target was in a sufficient rate and thus was effective (Table 3). Reviewing various adopted and revised/drafted policies, proclamations, regulations and strategies as well as the gazetted proclamations and regulations were some of the tools and methodologies used to assess the effectiveness of measures taken to implement the Target.

The main impacts of major interventions are demonstrated at different institutional levels and communities. For example, there have been increased awareness of policy makers on the need for legal frameworks such as Integrated National Land Use Policy, improved law enforcement, incentive systems for biodiversity and ecosystem services, improved protected area (PA) management systems, enhanced sustainable use and management of biological resources, increased stakeholders' engagement and sense of ownership, and participation of local communities. The effectiveness of measures taken in this Target contributed to the achievement of Aichi Biodiversity Target 3 (Incentives).

Target- 3: By 2020, biodiversity values and ecosystem services are communicated and integrated into national and local development and poverty reduction strategies and plans

A number of measures have been taken in order to quantify and communicate the values of biodiversity and integrate them into development and poverty reduction strategies. In connection to this, studies on valuation of biodiversity and ecosystem services were conducted and findings were communicated. These include study on public expenditure for biodiversity, the study and communication of payments for ecosystem services to the public and decision makers, and the signing of memoranda of understanding between potential investors and local communities on payment for ecosystem services. The findings of economic valuation of PAs were published and disseminated to stakeholders.

The assessment of effectiveness of the implementation measures taken to achieve the desired outcomes showed that the progress made towards achieving the Target was in an insufficient rate and thus was partially effective (Table 3). Review of annual reports and published papers, feedbacks from relevant stakeholders, formal and informal discussions with local communities, and field visits and surveys were some of the tools and methodologies used to assess the effectiveness of measures taken to implement the Target.

The main impacts of major interventions are demonstrated at different institutional levels, the private sectors and communities. For example, there has been increased recognition of the values of biodiversity and ecosystem services by the production sector (e.g. water bottling companies) and improved benefits for the community through such schemes as job creation and infrastructure development.

The effectiveness of measures taken in this Target contributed to the achievement of Aichi Biodiversity Targets: 1 (Awareness of Biodiversity Values), 2 (Integration of Biodiversity Values), and 19 (Biodiversity Knowledge).

Target- 4: By 2020, habitat conversion due to expansion of agricultural land is halved from the existing rate of about 10% per year

Appropriate measures were taken to decrease habitat conversion mainly due to agricultural land expansion. The major measures that have been taken to implement the Target include creating alternative jobs for local communities (Table 4) and adoption of improved technologies and innovations for increased productivity of smallholder farmers and pastoralists. Technologies and innovations were adopted and implemented for increased productivity include provision of agricultural extension service on irrigation, soil conservation, row planting of seeds, use of improved seed varieties, inorganic fertilizers, pesticides and organic fertilizers were enhanced to improve agricultural productivity per unit area. Alternative jobs created or services delivered to local communities to decrease habitat conversion are described in Table 4.

The assessment of effectiveness of the implementation measures taken to achieve the desired outcomes showed that the progress made towards achieving the Target was in a sufficient rate and thus was effective (Table 3). Reviewing annual reports, published papers, feedbacks from

relevant stakeholders, formal and informal discussions with local communities, and field visits and surveys were some of the approaches used to assess the effectiveness of measures taken to implement the Target.

Table 4. Some of the measures taken to reduce habitat conversion

No	Alternative jobs created/services delivered to local communities		Quantity (No.)	Sectors where jobs were created/services delivered
1	Jobs created	permanent	1,500,000	Metal, Leather, Garment, Chemical, Construction and Protected areas
		Temporary	84,410	
2	People benefited through income generation		720,000	Forestry sector
3	Improved stoves distributed		10,000,505	Energy sector
4	Solar site established		49	Water sector
5	Wind energy installed for water supply		4	Water sector
6	Biogas plants established		12,387	Energy sector
7	Solar home systems disseminated		107,633	Energy sector
8	Photovolatic systems distributed		1,511	Energy sector
9	Solar lanterns distributed		1,638,906	Energy sector
10	Solar system boilers distributed		368	Energy sector
11	Solar system water pumps distributed		32	Water sector

The main impacts of major interventions are demonstrated at different locality and community levels. For example, there have been reduced pressures on the habitat and increased knowledge on and application of alternative and efficient energy sources. The effectiveness of measures taken in this Target contributed to the achievement of Aichi Biodiversity Targets: 5 (Loss of Habitats) and 7 (Areas Under Sustainable Management).

Target- 5: By 2020, unsustainable utilization of biodiversity and ecosystem services are reduced

Various measures were taken to decrease unsustainable utilization of biodiversity and ecosystem services. These include promotion of afforestation, enhancing use of non-woody forest products, increasing forage productivity, promoting sustainable use of natural fish stock and expanding aquaculture, applying ecosystem-based management via *in situ* conservation, and drafting proclamation for conservation and sustainable use of wetlands.

To promote afforestation and use of non-woody forest products, 2.6 million ha of land was planted with various tree species whereas over 140,000 farmers participated in organic agriculture and use of non-woody forest products. Forage production from range and grazing lands has increased from 34.5 tons in 2016 to 124.5 million tons in 2019; seeds of different grass and legumes species were distributed, and grazing and rangelands were enclosed for sustainable use. Moreover, awareness of local communities on the sustainable use of natural fish stock was promoted, trainings on ecosystem management to conserve aquatic resources were conducted, exchange of experiences on sustainable aquaculture was made and over 2500 smallholder fish ponds were constructed to practice aquaculture.

The assessment of effectiveness of the implementation measures taken to achieve the desired outcomes showed that the progress made towards achieving the Target was in an insufficient rate and thus was partially effective (Table 3). Reviewing annual reports, published papers, feedbacks from relevant stakeholders, formal and informal discussions with local communities, and field visits and surveys were some of the approaches used to assess the effectiveness of measures taken to implement the Target.

The main impacts of major interventions are demonstrated at genetic resource, locality, community and institutional levels. For example, there have been improvements in sustainably managed species/breeds and ecosystems, increased rehabilitation of species, breeds and habitats, and enhanced restoration of ecosystems. The effectiveness of measures taken in this Target contributed to the achievement of Aichi Biodiversity Targets: 6 (Sustainable Fisheries), 7 (Areas Under Sustainable Management) and 8 (Pollution).

Target- 6: By 2020, the area invaded by invasive species is reduced by 75% and measures are in place to regulate and monitor invasive species, including newly emerging ones

Some measures were taken to reduce the total area of habitats taken-up by invasive alien species as well as to monitor their expansion. Studies on water hyacinth (*Eichornia crassipes)*, parthenium (*Parthenium hysterophorus)*, *Lantana camara,* prosopis (*Prosopis juliflora)* and the scale insect (*Dactylopius coccus)* were conducted to know the status while investigations on *Mimosa diplotricha, Argemone mexicana, Nicotiana glauca, Xanthium strumarium, Cirsium vulgare* and

Cryptostegia grandiflora were undertaken to determine the impacts of these invaders on biodiversity and the environment.

Implementation of measures that have been taken to regulate and monitor invasive species include assessment of the expansion of invasive alien species in selected areas. Furthermore, 15,915 ha of PAs were cleared from *Prosopis juliflora*, while 11,799 ha of grazing and agricultural lands were cleared from *Parthenium hysterophorus* and *Lantana camara.* Similarly, 4,962 ha of Lake Tana Biosphere Reserve was cleared from water hyacinth with intensive participation of local communities and other stakeholders. In connection to the latter undertaking, labor contribution amounting to about 43 million Ethiopian Birr was made by local communities.

The assessment of effectiveness of the implementation measures taken to achieve the desired outcomes showed that the progress made towards achieving the Target was at insignificant rate and thus was not effective (Table 3). Annual reports, monitoring and evaluation, feedback from relevant stakeholders, formal and informal discussion with local communities, and field visit and surveys were some of the tools and methodologies used to assess the effectiveness of measures taken to implement the Target.

Although the measures taken had insignificant effect on reducing area coverage by invasive alien species, the main impacts of major interventions are demonstrated at different institutional levels and communities. For example, there have been improved awareness of the public and decision makers regarding invasive alien species, and some invaded areas have been cleared. Although measures taken intending to achieve this Target were not effective, they somehow contributed to the achievement of Aichi Biodiversity Targets 9 (Invasive Alien Species).

Target- 7: By 2020, area coverage of ecologically representative and effectively managed PAs is increased from 14% to 20%

Diverse measures have been taken to increase area coverage of ecologically representative and effectively managed PAs. Identification of the gaps in the level of representativeness of the existing PAs, establishment of ecologically representative PAs, re-demarcation and development of management plans for the PAs, and conducting economic valuation of biodiversity are the four measures that were taken to implement the Target (Table 5).

Table 5. Measures taken to increase the coverage of ecologically representative PAs

Representativeness and gaps identified	Representative PAs established	PAs re-demarcated and management plan developed	Economic valuation conducted
The level of ecological representation assessed and identified: Benshangul Gumuz, Somali, Amhara, and Afar regional states and Dire Dawa City Council.	16 ecologically representative PAs established: Borena, Godebe, Weleka Beto and Abay, Bejimiz, Dedessa and Mao-Komo National Parks; Guna Mountains, Mahibere Silassie, Abune Yosef-Zigit Abahoy Garya; and Kalad Community Conservation Areas; Tana Biosphere reserve, and Dembel Aysha Adigala, Shinile Meto, Hadar, Amba Goda and Hawi Gudina Control Hunting Areas.	• Nine PAs re-demarcated: Gerale, Borena Sayint-Worehimenu, Yangudi Rassa, Abjata Shalla and Omo National Parks; Sorroro Torgum, Besmena Odabulu and Hanto Control Hunting Areas; and Halideghe Wildlife Reserve • 12 PAs Management plans developed: Kafta Shiraro, Chebera churchura, Borena Sayint-Worehimenu, Abjata Shalla Lakes, Simien Mountains, Bale Mountains, Alitash, Awash, Mago and Dati Welel National Parks; and Menz Guassa, and Abune Yosef-Zigit Abahoy Garya Community Conservation Areas.	Economic valuation of 14 PAs condcuted: Kafta Shiraro, Abjata Shalla Lakes, Simien Mountains, Bale Mountains, Alitash, Awash, Omo, Nech Sar, Yangudi Rassa, Gambella, and Gerale National Parks; Senkele Swayne's Hartebeest and Babile Elephant Sanctuaries and Halideghe Asebot Wildlife Reserve.

The assessment of effectiveness of the implementation measures taken to achieve the desired outcomes showed that the progress made towards achieving the Target was in a sufficient rate and thus was effective (Table 3). Annual reports, monitoring and evaluation, feedback from relevant stakeholders, formal and informal discussion with local communities, and field visit and surveys were some of the tools and methodologies used to assess the effectiveness of measures taken to implement the Target.

The main impacts of the interventions are demonstrated at different institutional levels and communities. For example, there have been enhanced efforts and improved conservation of ecosystems and species. The effectiveness of measures taken in this Target contributed to the achievement of Aichi biodiversity Target 11 (Protected Areas).

Target- 8: By 2020, *ex situ* conservation of agro-biodiversity, wild plants, animals and microbes; with special emphasis on endemic, endangered, economically or ecologically important species and breeds is increased and standards of the existing *ex situ* conservation are improved

Multiple measures were taken to increase the coverage and improve the standards of *ex situ* conservation with special emphasis on endemic, endangered, economically or ecologically important species and breeds. The major measures that have been taken include identification of threatened species of agro-biodiversity, wild plants, animals and microbial genetic resources and set priority for collection and conservation; increasing *ex situ* collections of species/breeds/ strains and accessions/straws; increasing the number of botanical gardens as well as identification and improving the standards of *ex situ* conservation.

The assessment of effectiveness of the implementation measures taken to achieve the desired outcomes showed that the progress made towards achieving the Target was in a sufficient rate and thus was effective (Table 3). Annual reports, and monitoring and evaluation results were some of the tools and methodologies used to assess the effectiveness of measures taken to implement the Target.

The main impacts of major interventions are demonstrated at different institutional levels and communities. For example, there have been reduced risk of extinction and genetic erosion of species, breeds, varieties, and strains; and enhanced sustainable utilization of genetic resources. The effectiveness of measures taken in this Target contributed to the achievement of Aichi Biodiversity Target: 12 (Preventing Extinctions) and 13 (Agricultural Biodiversity). The major measures that have been taken to implement the Target are described in Table 6.

Table 6. Measures taken to increase and improve the standards of *ex situ* conservation

No	Major measures taken and their detailed actions
1	Crop and Horticulture species/varieties/accessions collected and conserved *ex situ* • The total collection of crop and horticultural plants conserved *ex situ* reached 81,805 accessions of 4,094 varieties belonging to 34 species.
2	Forest and Rangeland species collected and conserved *ex situ* • The total collection of forest and rangeland plants conserved ex situ reached 4,079 accessions belonging to 1,057 species.
3	Animal species/breeds/straws conserved *ex situ* • The total collection of cattle semen conserved reached 71,700 straws while 24 straws of semen from Ethiopian Wolf (*Canis simensis*) have been conserved.
4	Microbial species/strains conserved *ex situ* • The total collection of microbial species/strains conserved reached 1087 (769 bacterial, 288 fungal and 30 microalgal).

Gaps identified in the process of implementation include a mismatch between area size and intended number of accessions to be conserved; shortage of conservation/genebank and laboratory facilities, and absence of duplicate genebank. Furthermore, 20 high forest and woodland species have been identified as threatened, five cattle and one-horse breeds as well 98 wild faunal (33 mammals, 33 birds, 11 frogs and toads, 11 fish and 10 insect) species have been identified as at risk. With the objective of strengthening conservation tasks, standards of existing *ex situ* conservation were improved from -10^0C to -20^0C to catch up with the international standards for base collections with the help of the newly established cold room that has a capacity of 134.3 m^3, a zoological museum, which maintains specimen of insect, mammal, amphibian, bird, fishes, benthic macro-invertebrate and reptile species, was established; herbarium collections were also enriched through addition of domestic and wild floral elements from around the country. Furthermore, two botanical gardens were established in two localities, Mekele and Dilla towns.

Target- 9: By 2020, *in situ* conservation sites for important species and breeds are increased and the standard off the existing *in situ* conservation are improved

Several measures have been taken to increase *in situ* conservation sites for important species and breeds and to improve the standard of the existing *in situ* conservation sites. Threatened species and sites/ecosystems were identified and priority was set for the identified *in situ* conservation sites. Moreover, the number of *in situ* conservation sites, species and, breeds increased, as well

as the management plan for different *in situ* sites developed. The major measures that have been taken to implement the Target are described in Table 7.

Table 7. Measures taken to increase and improve the standards of *in situ* conservation

No	Major measures taken and their detailed actions
1	Threatened species and sites/ecosystems and set priority for *in situ* conservation • The number of crop and horticultural plants conserved on-farm (*in-situ*) reached to 4,094 accessions of 61 varieties belonging to 34 species • Twenty threatened forest and rangeland plant species identified and seven forest priority areas were set for conservation • Seven breeds of domestic animals were identified for *in situ* conservation • Thirty-three terrestrial and wetland ecosystems of wild animal genetic resources were identified; two threatened wild animal species (Cheetah and Giraffe) in Ethio-Somali Regional State (Goro-Bekesa and Aware) were identified; annual-based census of water-birds has been conducted in 25 wetland ecosystems
2	*In situ* conservation sites established • The number of community seed banks of crop and horticulture reached 23 • The number of forest and rangeland plant species conserved reached 1,395; the number of forest and rangeland plants in situ conservation sites reached 22 • The number of in situ sites established reached 12 (for six domestic animal breeds, three lake ecosystems and three wetlands)
3	Management plans for *in situ* conservation sites developed • A management plan for forest and rangeland plants developed • Three management plans for animal biodiversity developed • Species specific conservation action plans developed for five threatened wild animals (African Lion, Wild Dog, Cheetah, Wild ass, Grevy's zebra)

The assessment of effectiveness of the implementation measures taken to achieve the desired outcomes showed that the progress made towards achieving the Target was in a sufficient rate and thus was effective (Table 3). Quarterly and annual reports, site supervision, periodic meetings, regular field visits and various quantitative and qualitative feedbacks from

stakeholders were some of the tools and methodologies used to assess the effectiveness of measures taken to implement the Target.

The main impacts of major interventions are demonstrated at different institutional levels and communities. This is exemplified by the reduced risk of extinction and genetic erosion of species, breeds, varieties and strains and enhanced sustainable utilization of genetic resources. The effectiveness of measures taken in this Target contributed to the achievement of Aichi biodiversity Target 12 (Preventing Extinctions) and 13 (Agricultural Biodiversity).

Target- 10: By 2020, the contribution of biodiversity and ecosystem services, including climate change adaptation and mitigation, is improved through increasing forest cover from 15% to 20% of the country, increased designated total area of wetlands from 4.5% to 9.0% and doubling the area of restored degraded lands

Several measures have been taken to improve the contribution of biodiversity and ecosystem services, including climate change adaptation and mitigation through increasing forest cover of the country. Interventions taken to meet the Target resulted in the following major outputs.

- 2.6 million ha of land was planted by various tree species,
- restored area of degraded land has increased to 18.4 million ha,
- land and water conservation via watershed management assisted the restoration of 622,062.52 ha; and physical and water conservation structures have reached 26.9 million ha,
- plantation land cover has reached 14.2 million ha whereas area enclosed has reached 6,778.5 ha.

The assessment of effectiveness of the implementation measures taken to achieve the desired outcomes showed that the progress made towards achieving the Target was in a sufficient rate and thus was effective (Table 3). Quarterly and annual reports, site supervision, periodic meetings, regular field visits and various quantitative and qualitative feedbacks from stakeholders were some of the tools and methodologies used to assess the effectiveness of measures taken to implement the Target.

The main impacts of major interventions are demonstrated at different institutional levels and communities. For instance there have been reduced risk of extinction and genetic erosion of species and enhanced ecosystem services. The effectiveness of measures taken in this Target contributes to the achievement of Aichi Biodiversity Target: 12 (Preventing Extinctions), 14 (Essential Ecosystem Services) and 15 (Ecosystem Resilience).

Target- 11: By 2020, the number of genetic materials accessed for research and development, and fair and equitable sharing of benefits arising from their use are increased by 24% and 39%, respectively.

Manifold measures have been taken to increase the number of genetic materials accessed for research and development, and fair and equitable sharing of benefits arising from their use. Accordingly, human and material capacity was built for bio-prospecting and negotiation. This includes, among others, national capacity building training to help the implementation of Nagoya Protocol and effective negotiation on Mutually Agreed Term, Regional capacity building training on the implementation of Nagoya Protocol and effective negotiation on Mutually Agreed Term, Regional capacity building training on implementation of Cartagena Protocol and effective International Negotiation and Regional capacity building training on implementation of ABS on the Animal Genetic Resources for Food and Agriculture.

Furthermore, the number of genetic materials distributed for research and development and bio-prospected species for access and fair and equitable benefit sharing have been promoted and increased. In this regard, 205,059 (200,183 accessions of field & horticultural crops, 938 accession of forest and rangeland plants, 3,650 straws of semen of domestic animals and 257 bacteria and 31 fungi species/strains) were distributed for research and development; the number of bio-prospected species for ABS has increased from 13 to 18 species and nine ABS agreements were signed on five species (*Bidens macroptera, Moringa stenopetala, Aloe* species, *Eucalyptus* species and *Rhizobium* bacteria (rhizobial bio-fertilizer).

Moreover, effort was made to control unauthorized movement of genetic resources by establishing checkpoints to monitor illegal movements of genetic resources at portal of entries/exits in critical locations in the country. The illegal wildlife trafficker controlling effort

have resulted in the seizure and confiscation of 73 larger wild mammals of eleven species (African lion, Cheetah, Spotted hyena, Bale monkey, Grivet monkey, Patas monkey, Gelada baboon, Hamadryas baboon, Anibus baboon, Reedbuck and Minilik's bushbuck) which were intended to be smuggled out of the country. The rescued animals were kept in the Orphanage Center for acclimatization.

The assessment of effectiveness of the implementation measures taken to achieve the desired outcomes showed that the progress made towards achieving the Target was in a sufficient rate and thus was effective (Table 3). To assess the effectiveness of measures taken to implement the Target, reports (Quarterly and annual), site supervision, periodic meetings, regular field visits and feedbacks from various stakeholders to collect quantitative and qualitative data were some of the tools and methodologies used to assess the effectiveness of measures taken to implement the Target.

The main impacts of major interventions are demonstrated at different institutional levels and communities. This is manifested by enhanced sustainable utilization from biodiversity, improved decision-making regarding biodiversity and related issues, enhanced recognition regarding the Country's sovereignty over its genetic resources and improved monetary and non-monetary benefits for local communities and the country. The effectiveness of measures taken in this Target contributed to the achievement of Aichi biodiversity Target 16 (Nagoya Protocol on ABS).

Target- 12: By 2020, women's access to and control over biodiversity resources and ecosystem services are improved

Measures have been taken to improve women's access to and control over biodiversity resources and ecosystem services. In line with this, National Gender Mainstreaming Guideline on biodiversity resources and ecosystem services was developed and implemented for the wildlife sector; and workshops and trainings on gender mainstreaming into biodiversity conservation and ecosystem services was conducted and incorporated into annual plans of major biodiversity and other related sectors.

There has been improved recognition of women's role on biodiversity conservation, sustainable utilization as well as on access and control over biodiversity resources and ecosystem services. Accordingly, the role of women as primary land and other natural resources managers has increasingly been recognized. Moreover, programs such as "Leave No Women Behind" was effected, gender equity and women's empowerment considerations were taken as a priority issue at all sectors, appointment of the share of women at the ministerial positions has reached 50%, Gender Directorate has been established in all sectors along the hierarchy, Jegnit (Heroine) Community Movement Program was launched, and Professional and Females Association was established in Higher Learning Institutions.

The assessment of effectiveness of the implementation measures taken to achieve the desired outcomes showed that the progress made towards achieving the Target was in an insufficient rate and thus was partially effective (Table 3). Quarterly and annual reports, supervision, periodic meetings, regular field visits and various quantitative and qualitative feedbacks from stakeholders were some of the tools and methodologies used to assess the effectiveness of measures taken to implement the Target.

The main impacts of major interventions are demonstrated at different institutional levels and communities. As the result, there have been improvements in livelihoods and enhanced decision making. The effectiveness of measures taken in this Target contributed to the achievement of Aichi Biodiversity Target 14 (Ecosystem Services).

Target- 13: By 2018, benefits from biodiversity are increased through value addition to at least 12 agro-biodiversity species and products, and creating market linkages for five species of medicinal plants; taking into account the needs of women and local communities

Multiple measures have been taken to achieve this Target. In accordance with this, value addition activities for agro-biodiversity species and products (for Teff, Coffee, Durum Wheat and Enset) were conducted including value chain assessment by taking into account their geographic origins. Similarly, value addition activities were carried-out for meat and milk through

processing and packaging as well as branding of local breeds and their products for local and international markets.

As a result of the above efforts, for example, 728,270 tons, 41,690 liters and 46,866.37 tons of chicken meat, milk and feed, respectively were processed, packaged and supplied to local markets in the span of six months. In this way, the Ethiopian Airlines was supplied with 8,000 liters of milk that would otherwise have been imported.

Value chains have been developed for crop products such as Teff, Wheat, Maize, Barley, Sorghum, Chickpea, Faba bean, Sesame, Coffee, Tomato, Potato, Onion, Ground nut, Black cumin, Banana and Mango through increasing small scale market access and efficiency. Thus; in the year 2017 alone, the country has generated over 1.06 billion USD from export of major crops such as coffee, pulses and oil crops.

Furthermore, linkage to potential niche markets for the value added agro-biodiversity species and medicinal plants was created. The potential niche market for *Moringa stenopetala* constitutes an example. A benefit sharing-based project on *Moringa stenopetala* was implemented with participation of 3,000 farmers as direct beneficiaries, and an initiative on the promotion of certified *Moringa stenopetala* products in the international market is underway.

The assessment of effectiveness of the implementation measures taken to achieve the desired outcomes showed that the progress made towards achieving the Target was in an insufficient rate and thus was partially effective (Table 3). Quarterly and annual reports, supervision, periodic meetings, regular field visits and various quantitative and qualitative feedbacks from stakeholders were some of the tools and methodologies used to assess the effectiveness of measures taken to implement the Target.

The main impacts of major interventions are demonstrated at different institutional levels and communities. The effectiveness of measures taken in this Target contributed to the achievement of Aichi Biodiversity Target 16 (Nagoya Protocol on ABS) and 19 (Biodiversity Knowledge).

Target- 14: By 2020, stakeholders' integration, including the participation of local communities in biodiversity conservation and sustainable utilization, is strengthened

Different measures have been taken to strengthen stakeholders' integration and the participation of local communities in biodiversity conservation and sustainable utilization. This involved putting in place a National Biodiversity Council and National Biodiversity Technical Committee; establishment and strengthening of ten Biodiversity Units at Regional States and, seven Biodiversity Centers at representative geographically areas.

The assessment of effectiveness of the implementation measures taken to achieve the desired outcomes showed that the progress made towards achieving the Target was in a sufficient rate and thus was effective (Table 3). Quarterly and annual reports, supervision, periodic meetings, regular field visits and various quantitative and qualitative feedbacks from stakeholders were some of the tools and methodologies used to assess the effectiveness of measures taken to implement the Target.

The main impacts of major interventions are demonstrated at different institutional levels and communities. For example, there has been improved implementation of the Et_NBSAP 2015-2020 implementation. The effectiveness of measures taken in this Target contributed to the achievement of Aichi Biodiversity Target 14 (Essential Ecosystem Services) and 18 (Traditional Knowledge).

Target- 15: By 2017, national biodiversity information system is strengthened, information dissemination strategy is devised and Clearing House Mechanism is updated

Measures have been taken to strengthen national biodiversity information system, devise information dissemination strategy and update the Clearing House Mechanism. Clearing House Mechanism (CHM) was regularly updated and CHM has been set, ABS was established, devising of national biodiversity database and dissemination strategy has been initiated, information was regularly disseminated through web-portal and DAD-IS AnGRFA_Ethiopia. In addition, information networking strategy was devised through virtual private network technology.

The assessment of effectiveness of the implementation measures taken to achieve the desired outcomes showed that the progress made towards achieving the Target was in a sufficient rate and thus was effective (Table 3) Quarterly and annual reports, supervision, periodic meetings, regular field visits and various quantitative and qualitative feedbacks from stakeholders were some of the tools and methodologies used to assess the effectiveness of measures taken to implement the Target.

The main impacts of major interventions are demonstrated at different institutional levels and communities. For example, there have been enhanced biodiversity conservation, sustainable use and access and benefit sharing, and better informed decision making. The effectiveness of measures taken in this Target contributed to the achievement of Aichi biodiversity Target 2 (Integration of Biodiversity Values), 18 (Traditional Knowledge) and 19 (Biodiversity Knowledge).

Target- 16: By 2020, knowledge and innovations related to biodiversity values, ecosystem functioning, status and trends, and the consequences of its loss are generated, reviewed, compiled and applied

Several measures have been taken to achieve this Target. In this regard, research on status, trends and threats of biodiversity, ecosystem services and ABS related issues were conducted by different sectors including universities and research institutions. Some of such studies made by the Ethiopian Biodiversity Institute and the Ethiopian Wildlife Conservation Authority in the last five years were;

- Studies on Barley, Wheat, Sorghum and spices (5),
- Assessment on the impact of sustainable land management of Ketech watershed biodiversity (2),
- Researches related to status, trends and threats of domestic, wild and aquatic animal biodiversity (20),
- Studies on vegetation composition, ethnobotany, agroforestry and ecosystem service valuation (13),
- Bio-prospecting researches (2), and
- Researches on traditional knowledge related to ABS issues and invasive alien species (8).

- Researches on microbial biodiversity and microbial related traditional knowledge (15) ,
- Studies on the status, trends, threats and management of PAs and wildlife (over 60).

The findings of the above studies were communicated to stakeholders through various outreaches such as journal articles, pamphlets, and other media.

Valuation studies were conducted on six species/varieties of field and horticultural crops, five breeds/species of animals and two forest and rangeland ecosystems. In addition, three valuation studies at ecosystem level, a study on economic values of 14 protected areas, valuation of three economically important plants, valuation of forest plants, and animal and a microbial species were conducted. Furthermore, a national account of forest sector to GDP and a pilot study on payment for ecosystem services were conducted. Besides, memorandum of understanding on payment for the ecosystem services between potential investors and local communities was signed; public expenditure for biodiversity was studied and communicated to decision makers; while the findings of economic valuation of PAs was published and disseminated.

The assessment of effectiveness of the implementation measures taken to achieve the desired outcomes showed that the progress made towards achieving the Target was in a sufficient rate and thus was effective (Table 3). Quarterly and annual reports, supervision, periodic meetings, regular field visits and various quantitative and qualitative feedbacks from stakeholders were some of the tools and methodologies used to assess the effectiveness of measures taken to implement the Target.

The main impacts of major interventions are demonstrated at different institutional levels and communities. For instance, there have been improved and better informed decision making, improved biodiversity conservation and sustainable use, increased recognition of values of biodiversity and ecosystem services and improved measures to ensure the sovereign rights over and the rights to share benefits arising from the utilization of biodiversity of the country. The effectiveness of measures taken in this Target contributed to the achievement of Aichi Biodiversity Target 19 (Biodiversity Knowledge).

Target- 17: By 2020, community knowledge, innovations and practices of local communities related to biodiversity are documented, subject to the national legislation, and relevant international obligations, and integrated into the national development strategies with the full and effective participation of local communities

Existing knowledge, innovations and practices of local communities relevant to biodiversity were reviewed, documented and communicated by concerned stakeholders including universities and research institutions to achieve this Target. Some of the outputs produced include:

- Ethiopian farmers traditional knowledge on teff (*Eragrostis tef*) farming, processing and production,
- Farmers traditional knowledge on teff (*Eragrostis tef*) farming practice and crop rotation in plant growth promoting microbes enhancement for soil fertility,
- Local community knowledge on medicinal plants,
- Traditional knowledge on agro-forestry practices,
- Community knowledge on Benshangul-Gumuz chicken meat consumption,
- Breeding and husbandry practices of Boset and Minjar-shenkora goat, Guji chicken,
- South Omo chicken and Gambela and Benishangul-Gumuz ducks,
- Community indigenous knowledge on traditional use of Arthrospira/Spirulina species,
- Community indigenous knowledge on traditional fermented enset product preparation and utilization practice,
- Traditional knowledge on mushroom consumption habits,
- Traditional practice of farmers' legume-cereal cropping system and the role of microbes for soil fertility improvement, and
- Traditional knowledge on milk production, processing and utilization.

The assessment of effectiveness of the implementation measures taken to achieve the desired outcomes showed that the progress made towards achieving the Target was in an insufficient rate and thus was partially effective (Table 3). Quarterly and annual reports, supervision, periodic meetings, regular field visits and various quantitative and qualitative feedbacks from

stakeholders were some of the tools and methodologies used to assess the effectiveness of measures taken to implement the Target.

The main impacts of major interventions are demonstrated at different institutional levels and communities. Consequently, there have been improved and better informed decision-making, increased recognition of values of traditional knowledge and innovations for biodiversity conservation and sustainable use. The effectiveness of measures taken in this Target contributed to the achievement of Aichi Biodiversity Target 18 (Traditional Knowledge) and 19 (Biodiversity Knowledge).

Target- 18: By 2020, mobilization of financial resources from internal and external sources required for effective implementation of the strategy is increased substantially

Several measures were taken to achieve this Target. Development of competent projects for seeking funds was one of the major ventures. In line with this, project documents were developed by different institutions such as the Ethiopian Biodiversity Institute (EBI) and Ethiopian Wildlife Conservation Authority (EWCA) and secured funding. These include:

- A project proposal on national community seed bank platform for strengthening informal seed system, submitted to FAO,
- A project proposal on conservation and sustainable utilization of the threatened Sheko cattle breed, submitted to AU-IBAR,
- Over 13 small/large project proposals by EBI, submitted to various partners,
- A project proposal on ABS capacity building, submitted to Darwin Initiative, and
- Over twenty five small/large scale projects/initiatives that support PAs management programs by EWCA, submitted to various partners.

Moreover, two documents on resources required for the implementation of Et_2015-2020 prepared on target by target and year by year basis has been submitted to SCBD.

The assessment of effectiveness of the implementation measures taken to achieve the desired outcomes showed that the progress made towards achieving the Target was in an insufficient rate and thus was partially effective (Table 3). Reports (Quarterly and annual), supervision, periodic

meetings, regular field visits and various quantitative and qualitative feedbacks from stakeholders were some of the tools and methodologies used to assess the effectiveness of measures taken to implement the Target.

The main impacts of major interventions are demonstrated at different institutional levels and communities. As the result, there has been better implementation of the Et_NBSAP 2015-2020. The effectiveness of measures taken in this Target contributed to the achievement of Aichi Biodiversity Target 20 (Resource Mobilization).

5. CHALLENGES ENCOUNTERED AND LESSONS LEARNED

During the implementation of the Et_NBSAP 2015-2020, some difficulties that may be regarded as challenges, critical hindrances that could also be classified as obstacles have been encountered. As a means to overcome these challenges and obstacles, scientific and technical needs were identified and some have been addressed. The whole implementation process, precipitated in valuable lessons which could be used for better implementation of Post 2020 Biodiversity Framework.

5.1. Challenges

The most significant challenges encountered during the implementation of the Et_NBSAP 2015-2020 were absence of national biodiversity database and networking; growing reluctance by international donors to grant funds for conservation and sustainable use initiatives; inadequate collaboration, integration and low level of commitment of stakeholders; inadequate financial and technical capacity; frequent changes in institutional arrangements,, overlapping and fragmented mandates *vis-a'-vis* biodiversity conservation undertakings; absence of binding mechanism for the enforcement of the implementation of Et_NBSAP 2015-2020 by concerned implementing institutions as per the commitment. Absence of a properly staffed and budgeted NBSAP coordination structure at national level constituted additional drawback.

The major scientific, technical and capacity supports needed for effective implementation of the Et_NBSAP 2015-2020 include:

- skills and facilities to establish national biodiversity database and network,
- skills and facilities required to generate baseline information,
- financial and technical capacity,
- sustainable domestic financial mobilization system,
- collaboration with local stakeholders and international partners,
- putting in place appropriate national policy framework and institutional setup,
- raising awareness of general public and policy makers,
- maintaining synergy among and commitment of key stakeholders,
- enhancing science-policy interface, and
- realizing biodiversity and related COP decisions.

5.2. Lessons Learned

Despite limitations in the implementation of Et_NBSAP 2015-2020, valuable lessons were learned which would be used as inputs for future implementation of similar endeavors. As experience showed, resources from the national treasury were used for the implementation of most of the National Biodiversity Targets, and this suggests the need for relying on enhanced domestic resource mobilization instead of too much dependence on the international sources. The fact that the Et_NBSAP 2015-2020 has not gone through all legislative process, particularly endorsement at the parliament level as a legal instrument, denied it the quality of binding nature. The impact of this is reflected by the lack of commitment by the relevant sectors and other actors to give prior attention to the implementation of actions dedicated to each.

6. CONCLUSION AND RECOMMENDATIONS

Ethiopia, as a country of rich biodiversity confronted with a serious threat of erosion, has been undertaking measures targeted to conservation of biodiversity and sustainable use of the components as well as ensuring fair and equitable sharing of benefits arising from the use of genetic resources and associated community knowledge. Interventions that range from putting in place the appropriate institutional setup and legal frameworks through assessment, characterization and identification of genetic resources to identification of threats posed and challenges encountered as well as setting priorities and implementation of conservation and sustainable utilization-oriented tasks have been applied.

The National Biodiversity Strategy and Action Plan (Et_NBSAP 2015-2020), which was formulated in line with the Global Strategic Plan for Biodiversity 2011–2020, was implemented to the level that could be judged as effective since the progress towards achieving 55.56% of the Targets was found to be highly effective while about 38.9% was found to be fairly satisfactory as indicated in Table 3. The satisfactory implementation of Et_ NBSAP 2015-2020 contributes to achievements in the three objectives of the Convention which, in turn, have contribution to the economic development and poverty reduction goals of the country. As reported to the Secretariat of the Convention on Biological Diversity (SCBD) in April 2019, the status of implementation of 10 of the Et_NBSAP 2015-2020 was indicated as green which means the implementation status was effective and beyond the expectation while that of seven and one were indicated in yellow and red which represents the implementation status as "partially ineffective" and "not effective, respectively.

Despite the status of implementation of the largest proportion (94.46%) of Et_NBSAP 2015-2020 National Targets was determined to be either effective or partially ineffective (marked green and yellow, respectively), the implementation of one of the targets was evaluated to be not effective (marked red). The observed lag in the status of implementation of the targets (marked yellow and red) is largely attributed to lack of commitment by lead institutions either to satisfactorily execute tasks or coordinate their execution by collaborating stakeholders as stipulated in the strategy. Inability to secure adequate financial resources, absence of national data sharing mechanism, lack of binding mechanism that ensures better enforcement of the agreed implementation arrangements, and failure to put in a fully capacitated NBSAP

coordination structure at national level contributed further to the observed inefficient performance.

The whole process of development and implementation of Et_NBSAP 2015-2020 constitutes a real opportunity from which valuable lessons were gained. The needs for robust internal resources mobilization strategy as well as the importance of a binding mechanism that governs lead and collaborating implementers of future similar ventures are among the major lessons learned.

From such point of departure, therefore, it would be wise to recommend that:
- future planning for implementing similar national strategies need to fill the gap or devise a mechanism that will help overcome challenges encountered during the implementation of Et_NBSAP 2015-2020,
- the accomplishments ought to be valued properly as this would lend energy to ignite motivation and arouse enthusiasm to engage in future conservation and sustainable development related endeavors, and
- the Ethiopian experience should be shared in international fora and processes such as the formulation of the Post 2020 Biodiversity Framework.

7. Annexes

Annex I. Strategic Goals and Aichi Biodiversity Targets 2011-2020

Strategic Goal A: Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society

Target 1
By 2020, at the latest, people are aware of the values of biodiversity and the steps they can take to conserve and use it sustainably.

Target
By 2020, at the latest, biodiversity values have been integrated into national and local development and poverty reduction strategies and planning processes and are being incorporated into national accounting, as appropriate, and reporting systems.

Target 3
By 2020, at the latest, incentives, including subsidies, harmful to biodiversity are eliminated, phased out or reformed in order to minimize or avoid negative impacts, and positive incentives for the conservation and sustainable use of biodiversity are developed and applied, consistent and in harmony with the Convention and other relevant international obligations, taking into account national socio economic conditions.

Target 4
By 2020, at the latest, Governments, business and stakeholders at all levels have taken steps to achieve or have implemented plans for sustainable production and consumption and have kept the impacts of use of natural resources well within safe ecological limits.

Strategic Goal B: Reduce the direct pressures on biodiversity and promote sustainable use

Target 5
By 2020, the rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero, and degradation and fragmentation is significantly reduced.

Target 6
By 2020 all fish and invertebrate stocks and aquatic plants are managed and harvested sustainably, legally and applying ecosystem based approaches, so that overfishing is avoided, recovery plans and measures are in place for all depleted species, fisheries have no significant adverse impacts on threatened species and vulnerable ecosystems and the impacts of fisheries on stocks, species and ecosystems are within safe ecological limits.

Target 7
By 2020 areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity.

Target 8
By 2020, pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity.

Target 9
By 2020, invasive alien species and pathways are identified and prioritized, priority species are controlled or eradicated, and measures are in place to manage pathways to prevent their introduction and establishment.

Target 10
By 2015, the multiple anthropogenic pressures on coral reefs, and other vulnerable ecosystems impacted by climate change or ocean acidification are minimized, so as to maintain their integrity and functioning.

Strategic Goal C: To improve the status of biodiversity by safeguarding ecosystems, species and genetic Diversity

Target 11
By 2020, at least 17 per cent of terrestrial and inland water, and 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well-connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes and seascapes.

Target 12
By 2020 the extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained.

Target 13
By 2020, the genetic diversity of cultivated plants and farmed and domesticated animals and of wild relatives, including other socio-economically as well as culturally valuable species, is maintained, and strategies have been developed and implemented for minimizing genetic erosion and safeguarding their genetic diversity.

Strategic Goal D: Enhance the benefits to all from biodiversity and ecosystem services

Target 14
By 2020, ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and well-being, are restored and safeguarded, taking into account the needs of women, indigenous and local communities, and the poor and vulnerable.

Target 15
By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced, through conservation and restoration, including restoration of at least 15 per cent of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification.

**Strategic Goal E: Enhance implementation through participatory planning,
knowledge management   and capacity building**

Target 17
By 2015 each Party has developed, adopted as a policy instrument, and has commenced implementing an effective, participatory and updated national biodiversity strategy and action plan.

Target 18
By 2020, the traditional knowledge, innovations and practices of indigenous and local communities relevant for the conservation and sustainable use of biodiversity, and their customary use of biological resources, are respected, subject to national legislation and relevant international obligations, and fully integrated and reflected in the implementation of the Convention with the full and effective participation of indigenous and local communities, at all relevant levels.

Target 19
By 2020, knowledge, the science base and technologies relating to biodiversity, its values, functioning, status and trends, and the consequences of its loss, are improved, widely shared and transferred, and applied.

Target 20
By 2020, at the latest, the mobilization of financial resources for effectively implementing the Strategic Plan for Biodiversity 2011-2020 from all sources, and in accordance with the consolidated and agreed process in the Strategy for Resource Mobilization should increase substantially from the current levels. This target will be subject to changes contingent to resource needs assessments to be developed and reported by Parties.

Annex II. Major challenges encountered and scientific and technical needs required by target by target basis

Targets	National Biodiversity Targets	Challenges	Scientific and Technical Needs
1	By 2020, awareness of public and decision makers on the values of biodiversity and ecosystem services is raised, and the steps they can take to conserve and use them sustainably is improved	• inadequate financial resources • weak collaboration among stakeholder	• skills and facilities required to generate baseline information • skills and facilities to establish database and dissemination system • capacity development on fund raising • raise the level of awareness for policy makers on biodiversity valuation
2	By 2020, the existing biodiversity related laws, regulations and strategies, including those associated with incentives are reviewed and gaps are addressed	• inadequate financial resources • lack of skilled man power • inadequate collaboration among stakeholders • low level of commitment	• baseline information to identify policies, regulations and strategies that require drafting/revising • adequate financial support • capacity building of professionals in the sectors • raise the level of understanding of policy makers on biodiversity
3	By 2020, biodiversity values and ecosystem services are communicated and integrated into national and local development and poverty reduction strategies and plans	• inadequate financial resources • lack of skilled man power • inadequate collaboration among stakeholders • weak communication of the study results	• baseline information • adequate financial support • capacity building of professionals in the sector
4	By 2020, habitat conversion due to expansion of agricultural land is halved from the existing rate of about 10% per year	• lack of national database • inadequate collaboration among stakeholders • limited technologies/expertise	• establish national biodiversity database system • financial and technical capacity development
5	By 2020, unsustainable utilization of biodiversity and ecosystem services are reduced	• inadequate data • weak collaboration among stakeholders • institutional instability • lack of skilled human resource	• basic conditions for establishing national database • human capacity development • fostering synergy among institutions
6	By 2020, the area invaded by invasive species is reduced by 75% and measures are in place to regulate and monitor invasive species, including newly emerging ones	• lack of national strategy • inadequate collaboration and integration among stakeholders • lack of sustainable financial source and efficient technology • knowledge gap on the unpredictable nature of invasive species	• putting in place appropriate national policy framework and institutional setup • enhancing financial and technical capacity development • fostering synergy among stakeholders
7	By 2020, area coverage of ecologically representative and effectively managed	• inadequate funding • lack of skilled man power	• financial and technical capacity development

Targets	National Biodiversity Targets	Challenges	Scientific and Technical Needs
	PAs is increased from 14% to 20%	• limited partnership • weak collaboration among stakeholders	• collaboration with stakeholders and partners
8	By 2020, *ex situ* conservation of agro-biodiversity, wild plants, animals and microbes; with special emphasis on endemic, endangered, economically or ecologically important species and breeds is increased and standards of the existing *ex situ* conservation are improved	• inadequate financial resources • limited skilled human power • limited partnership • weak collaboration among stakeholders	• financial and technical capacity • collaboration with stakeholders and partners
9	By 2020, in situ conservation sites for important species and breeds are increased and the standard of the existing in situ conservation are improved	• inadequate financial resources • limited skilled human resource • limited partnership • weak collaboration among stakeholders	• financial and technical capacity • collaboration with stakeholders and partners
10	By 2020, the contribution of biodiversity and ecosystem services, including climate change adaptation and mitigation, is improved through increasing forest cover from 15% to 20% of the country, increased designated total area of wetlands from 4.5% to 9.0% and doubling the area of restored degraded lands	• inadequate financial resources • limited partnership • lack of stakeholders collaboration • lack of clear mandate related to wetlands	• financial and technical capacity • collaboration with stakeholders and partners • setting clear mandate to wetlands
11	By 2020, the number of genetic materials accessed for research and development, and fair and equitable sharing of benefits arising from their use are increased by 24% and 39%, respectively	• limited level of awareness • absence of national data sharing mechanism and accessibility • weak collaboration among stakeholders • inadequate financial source and technical capacity	• financial and technical capacity to formulate national data sharing and accessibility policy • undertakings that promote commitments among stakeholders
12	By 2020, women's access to and control over biodiversity resources and ecosystem services are improved	• limited level of awareness • weak collaboration among stakeholders • inadequate financial resource and technical capacity	• financial and technical capacity to raise awareness • undertakings that promote commitments among stakeholders
13	By 2018, benefits from biodiversity are increased through value addition to at least 12 agro-biodiversity species and products, and creating market linkages for five species of medicinal plants; taking into account the needs of women and local communities	• limited level of awareness • weak collaboration among stakeholders • inadequate financial resource and technical capacity	• financial and technical capacity to promote awareness • undertakings that promote commitments among stakeholders
14	By 2020, stakeholders' integration, including the participation of local communities in biodiversity conservation and sustainable utilization, is strengthened	• limited financial resource and technical capacity • inadequate collaboration and integration among stakeholders • poor processing, market	• financial and technical capacity • undertakings that promote commitments among key actors

Targets	National Biodiversity Targets	Challenges	Scientific and Technical Needs
		linkage and lack of encouraging systems	
15	By 2017, national biodiversity information system is strengthened, information dissemination strategy is devised and Clearing House Mechanism is updated	• limited financial resource and technical capacity • inadequate collaboration and integration among stakeholders	• financial and technical capacity • undertakings that promote commitments among key actors
16	By 2020, knowledge and innovations related to biodiversity values, ecosystem functioning, status and trends, and the consequences of its loss are generated, reviewed, compiled and applied	• limited financial resource and technical capacity • inadequate collaboration and integration among stakeholders	• financial and technical capacity • undertakings that promote commitments among key actors
17	By 2020, community knowledge, innovations and practices of local communities related to biodiversity are documented, subject to the national legislation, and relevant international obligations, and integrated into the national development strategies with the full and effective participation of local communities	• limited financial resource and technical capacity • inadequate collaboration and integration among stakeholders	• financial and technical capacity • undertakings that promote commitments among key actors
18	By 2020, mobilization of financial resources from internal and external sources required for effective implementation of the strategy is increased substantially	• reluctance by international donors to grant project ideas • inadequate collaboration and integration among stakeholders	• realize CBD-COP decisions regarding finance and resource mobilization, and Aichi biodiversity target 20 • technical capacity development • develop sustainable domestic financial mobilization system

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