MAINSTREAMING AGRO-BIODIVERSITY CONSERVATION INTO THE AGRICULTURAL PRODUCTION SYSTEMS OF ETHIOPIA PROJECT

Identification of Gaps and Formulation of Recommendations on Policies and Institutional Frameworks to Mainstream Agro-Biodiversity Conservation

June 2014
Addis Ababa
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DIRECTOR GENERAL MESSAGE

Ethiopia is recognized as a center of agro-biodiversity, designated as one of eight original centers for domestication of crops around the world. The Ethiopian population has been actively engaged over the millennia in crop domestication and hybridization efforts to suit local needs and testes and deal with the vagaries of climate and geo-physical conditions. The country harbors important gene pools of wild crop relatives including grains, pulses, oil seeds, vegetables, tubers, fruits, spices, stimulants, fibers, dyes, and medicinal plants. In addition, several crops that were domesticated outside of East Africa exhibit high secondary diversification in Ethiopia, evidenced in farmer varieties of wheat, barely, and several pulses. The indigenous landraces of various crop plant species, their wild relatives, and the wild and weedy species are all highly prized for their potential value as sources of important traits for crop improvement programs. Among the most important traits that are believed to exist in these landraces are disease and pest resistance, nutritional quality, resistance to drought and other stress.

Despite the national and international importance, Ethiopia's agro-biodiversity is highly threatened by a number of factors among which land degradation, deforestation, and habitat conversion are the main and the consequent loss of wild relatives, and the replacement of land races and farmer varieties with hybrid high yielding varieties. The loss of farmer's varieties is unfortunately accompanied by loss of the indigenous technical knowledge natured by generations of Ethiopian farmers. In addition, there are several anthropogenic reasons causing the loss of such agro-biodiversity resources like policy failure to recognize agro-biodiversity, institutional set-up, and lack of marketing strategy focusing these resources.

Due to such reasons, the country in general and more specifically the farmers, are not benefited and are found losers which is paradox.

In view of these unprecedented problems affecting agro-biodiversity in the country, a project called mainstreaming agro-biodiversity conservation into the farming systems, has been implementing for enabling policy and institutional framework to support in-situ conservation of agro-biodiversity and wild crop relatives as one of the project objectives.

As a result of this project's activity, policies and institutional frameworks of key stakeholders with regard to agro-biodiversity conservation were reviewed and assessed and the existing gaps identified and proposed solutions forwarded with mutual efforts made by all key stakeholders indicated in this document. It is therefore, I kindly request you to play your invaluable role in the conservation of agro-biodiversity resources.

Gemedo Dalle (PhD)
Director General, Ethiopian Biodiversity Institute
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<thead>
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<th>ACRONYMS</th>
<th>Definition</th>
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<tbody>
<tr>
<td>ADLI</td>
<td>Agricultural Development Led Industrialization</td>
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<tr>
<td>ARDB</td>
<td>Agriculture and Rural Development Bureau</td>
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<tr>
<td>ARDD</td>
<td>Agriculture and Rural Development Department</td>
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<tr>
<td>ARDO</td>
<td>Agriculture and Rural Development Office</td>
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<td>Art</td>
<td>Article</td>
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<td>BOA</td>
<td>Bureau of Agriculture</td>
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<td>BSAP</td>
<td>Biodiversity Strategic Action plan</td>
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<tr>
<td>CBD</td>
<td>Convention on Biological Diversity</td>
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<td>CCD</td>
<td>Convention on Combating Desertification</td>
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<tr>
<td>CITES</td>
<td>Convention in International Trade in Endangered Species</td>
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<td>CMS</td>
<td>Convention on Migratory Species</td>
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<tr>
<td>CRGE</td>
<td>Environmental Impact Assessment</td>
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<td>EIAE</td>
<td>Ethiopian Institute of Agricultural Research</td>
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<td>EBI</td>
<td>Ethiopian Biodiversity Institute</td>
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<td>EPA</td>
<td>Environmental Protection Agency</td>
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<td>FTC</td>
<td>Farmers Training Center</td>
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<td>FV</td>
<td>Farmer Varieties</td>
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<td>GDP</td>
<td>Gross Domestic Product</td>
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<td>GEF</td>
<td>Global Environmental Facility</td>
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<td>GMO</td>
<td>Genetically Modified Organism</td>
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<td>GTP</td>
<td>Growth and Transformation Plan</td>
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<td>Ha</td>
<td>Hectare</td>
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<td>HYV</td>
<td>High Yielding Variety</td>
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<tr>
<td>ITPGFA</td>
<td>International Treaty on Plant Genetic resources for Food and Agriculture</td>
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<tr>
<td>LEPB</td>
<td>Land Administration and Environmental Protection Bureau</td>
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<tr>
<td>MDG</td>
<td>Millennium Development Goals</td>
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<tr>
<td>MOA</td>
<td>Ministry of Agriculture</td>
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<td>MOEF</td>
<td>Ministry of Environment and Forestry</td>
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<tr>
<td>MOTI</td>
<td>Ministry of Trade and Industry</td>
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<tr>
<td>NBSAP</td>
<td>National Biodiversity Strategy and Action Plan</td>
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<tr>
<td>OFWE</td>
<td>Oromiya Forest and Wild Life Enterprise</td>
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<tr>
<td>PASDEP</td>
<td>Plan for Accelerated and Sustainable Development to End Poverty</td>
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<tr>
<td>Proc</td>
<td>Proclamation</td>
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<td>RDPS</td>
<td>Rural Development Policy and Strategy</td>
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<tr>
<td>SLMP</td>
<td>Sustainable Land Management Project</td>
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<tr>
<td>SNNPR</td>
<td>Southern Nation and Nationalities Peoples’ Region</td>
</tr>
<tr>
<td>UNDP</td>
<td>United Nations Development Program</td>
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<td>WHC</td>
<td>World Heritage Convention</td>
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EXECUTIVE SUMMARY

Ethiopia is recognized as a center of agro-biodiversity and is designated as one of the eight vavilovian centers of origin and diversity of various crops of global importance including sorghum, millet, coffee Arabica (which is proposed to be coffee abysinica), durum wheat, and tef, among others. Ethiopia is also harbors important wild crop which are gene pools for at least 120 species of cultivated crops, including grains, pulses, oil seeds, vegetables, tubers, fruits, spices, stimulants, fibers, dyes, and medicinal plants due to its diverse agro-ecologies, farming systems, socio-economic conditions, and cultures (Fassil, proceedings of the 5th green forum conference, Addis Ababa, 2010). Among these, the indigenous landraces (farmers’ varieties) are highly prized for their potential value as sources of important traits for crop improvement, food and income sources, as well as a risk-aversion strategy against crop failure. Despite national and international importance, Ethiopia’s agro-biodiversity resources both wild species and crop cultivars have greatly threatened as a result of commercialization of agriculture, changes in consumption patterns, conversion to modern high-input agriculture, and the globalization of agricultural markets.

As a mechanism to tackle these threats, it is recommended to mainstream agro-biodiversity into policies, laws, strategies, and activities of all sectors having stakes to address the issue and safeguard farmers’ varieties and wild relatives from degradation and depletion. This is indicated by recent studies that concluded, agro-biodiversity will only be manifested if the country mainstreams agro-biodiversity into production systems and landscapes through strategies that simultaneously promote food production and biodiversity conservation (Fassil, et al. 2010). For this purpose policy and institutional gap analysis were made to point out the real condition and related obstacles that may hamper mainstreaming of agro-biodiversity into agricultural production system and way forward for future improvement.

As a result of reviews of the existing policies, it is found that there is no any articulation of the strategies specific to the conservation and sustainable use of agro-biodiversity in general and the mainstreaming of agro-biodiversity into policies and strategies in particular. Agricultural policy of Ethiopia aimed to increase production using improved varieties. Even though improved varieties have their own contribution in improving production of crops and socio-economics of the country, the attention given to agro-biodiversity conservation with farmers’ varieties such as forest coffee, durum wheat, tef and enset is minimal.

However, the country’s policies do not integrate how to export value added commodities to ensure the benefit of farmers and the country’s economic growth through sustainable production systems. Moreover, with the responsible sectors and key stakeholders, there is lack of integration towards agro-biodiversity conservation in relation to aforementioned crops.

Though the agricultural strategy targets to support agro-processing and exportable agricultural products, there is a gap to state how quality of agricultural product would be produced by enhancing agro-biodiversity conservation in the sector. In response to the growing demand for food and related markets, the country’s extension service gives emphasis more on a high yield varieties even in areas where farmers’ varieties are favored and better suited. On the other hand, lack of agricultural extension packages, labeling, and certification for farmers’ variety daunts the productivity potential, conservation, and quality of farmers’ varieties. This arises from the gaps in policies, lack of coordination mechanisms and incentives, and lack of market promotion activities to farmers’ varieties.
Based on the assessment conducted on the identification of institutional frameworks, it is found that there is no defined agro-biodiversity conservation structure under key stakeholders and community level. This is attributed to absence of mandates and working structures of biodiversity conservation at federal, regional and woreda level. In addition, the extension services under the agricultural system do not integrate the supporting activities with agrobiodiversity and farmers’ varieties. Again, research institutions and universities in the country are not sufficiently engaged in conducting research and teachings in relation with the conservation of agro-biodiversity with emphasis to farmers’ varieties. As a result of this, there are gaps regarding seeking solution for diseases that have been destroying farmers’ varieties, low yields, and poor management of uncertainties with impacts of climate change.

In general, the absence of defined agro-biodiversity conservation working structure (system) and gaps on policies, strategies and activities, are hindering immense current and future potential of agro-biodiversity especially farmers’ varieties to meet the needs of farmers’ by respecting and recognizing their knowledge, as well as the national and international agricultural needs including food security issues.

To ensure conservation and sustainable utilization of agro-biodiversity in Ethiopia, it requires mainstreaming into farming systems through appropriate strategies and biodiversity conservation mechanisms including crop wild relatives. Thus, re-examining policies, laws, strategies, and plans those give adequate consideration to mainstream agro-biodiversity while enhancing economic development found to be very essential. Taking climate change into consideration, there is a need to revisit and amend the gaps among different institutions such as biodiversity, environment and forest, agriculture, and trade that have stake with agrobiodiversity.

An institutional framework that networks all levels (from national up to grassroots including research institutions, universities, NGOs, and community organizations) for mainstreaming agro-biodiversity conservation into the farming systems should be established. Research has to be conducted to resolve the existing problems and enable ensure better productivity and conservation for sustainability of agro-biodiversity. To get the benefit out of the farmers’ varieties through agro-biodiversity conservation, farmers need motivation and capacity building supports.
1. INTRODUCTION

1.1. Concepts of Agro-biodiversity

Agro-biodiversity is a vital sub-set of biodiversity, which encompasses the genes and species of all sorts of living things including microorganism and the ecosystems in which they interact. Agro-biodiversity as a sub-set of biodiversity consists of many food and non-food values and services that make up the basis of livelihood for billions of people all over the world (MELCA-Ethiopia, 2011). Furthermore, agro-biodiversity is the variability among animals, plants, and microorganisms and their diversity that are used directly or indirectly for food and agriculture including crops, livestock, forestry, and fisheries.

The values of agro-biodiversity therefore, comprise the products of interrelated functions of biological, ecological, and social factors and it should be considered as a set of biological, ecological and social asset or capital, which should aggregately be seen as the back bone of livelihoods based on agriculture. Again, to manage agro-biodiversity efficiently, with the stability of the farming and production systems and remain in harmony with the agro-ecology systems, sustainable agriculture should be ensured.

Farmers’ varieties, parts of agro-biodiversity are crop species, which are developed by natural processes, by adaptation to the natural and cultural environment in which they live. Ethiopian farmers’ have selected, domesticated, and put in use their crop varieties in a traditional way for many generations. By choosing seeds or planting materials that meet their needs, farmers have developed local varieties that suit their specific farming circumstances and preferences. Farmers, especially those engaged in traditional small-scale farming are known to be the primary custodians of the various crop varieties (MELCA-Ethiopia, 2011). It is also fact that the level of economic gains made from agro-biodiversity depends mainly on the existing indigenous crop/plant and livestock diversity, and on the practices and knowledge of the local farmers.
1.2. Status of Agro-biodiversity in Ethiopia

Ethiopia is recognized as a center of agro-biodiversity, designated as one of eight Vavilovian Centers around the World that harbors 172 species in home garden (Zemede, 2004) and important gene pools of wild crop relatives for at least 197 species of crops, including grains, pulses, oil seeds, vegetables, tubers, fruits, spices, stimulants, fibers, dyes, and medicinal plants. The different crop types and varieties that the country has today are results of farmers’ long term domestication, adaptation, and selection efforts. In addition, several crops that were domesticated outside of east Africa exhibit high secondary diversification in Ethiopia, evidenced in farmer varieties (FV) of wheat, barely, and several pulses. For example, in relation to crop diversity, different regions of the world have been labeled as global centers of diversity for different crop varieties and Ethiopia is among the leading global centers of diversity. It is known to be a center of diversity for crops such as tef, barely, Ethiopian sunflower, enset and coffee (MELCA-Ethiopia, 2011). This is mainly attributed to its diverse agro-ecologies, farming systems, socio-economic conditions, and cultures.

In Ethiopia, agro-biodiversity is strongly linked to local communities, providing them with diverse services and benefits that vary according to the farming systems (Gemedo, 2012). Agro-ecology of Ethiopia is diverse being inhabited by diverse farming communities that employ varying agricultural practices using farmers’ varieties for various traits and needs. Agro-climatic, socio-economic and cultural conditions of the local communities therefore, influence the types and genetic diversity of the crops grown.

Genetic diversity provides the opportunity to have access to a variety of food and income sources, particularly for farmers with limited resources. The diversity in crops is essential for intensifying production and as a risk-aversion strategy against crop failure due to climate change and natural calamities. For instance, under unfavorable conditions, failure of one crop is compensated by the yields of other crops where Ethiopian farmers grow several genetically distinct varieties of crops in a single field, as a risk-aversion strategy against crop failure. In addition, where small-scale traditional varieties that fit the range of agro-ecosystems is the primary decisive factor (MELCA-Ethiopia, 2011).

Thus, the Ethiopian population has been actively engaged over the centuries in crop domestication and hybridization efforts to suit local tastes and deal with the vagaries of climate and geo-physical conditions. Accordingly, teff, durum wheat, enset and forest coffee among
many others remains Ethiopian farmers' varieties. The indigenous landraces of various crop plant species, their wild relatives, and the wild and weedy species are all highly prized for their potential value as sources of important traits for crop improvement programs in Ethiopia. Among the most important traits that are believed to exist in these landraces are disease and pest resistance, nutritional quality, resistance to drought and other stresses.

However, these landraces and farmers varieties are highly threatened by anthropogenic effects and natural calamities including climate change effects which poses a serious challenge to the development of the agro-biodiversity potential of the country.

To tackle these problems, various efforts have been made toward the conservation and enhancement of the major indigenous crops/plants. To date, EBI has conserved 68,014 accessions and 6,700 accessions of different crops in cold rooms and field gene banks, respectively (IBC, 2012). Moreover, the size of the collections has been increased by 13% over the period 2007 to 2012. The lion shares of the conserved germplasm in the gene bank are farmers' varieties, and grain crops alone make up more than 97 percent of the total holdings).

Although the country is known as a center of crop diversity until recently, these days, Ethiopian farmers are facing challenges in seed supply in relation with shortage of seed, displacement of farmer varieties which reduces available options for farmers, lack of resource to meet the demands of high input verities, agro-ecological instabilities, loss of time-tested traditional knowledge and practices and fluctuation in climate conditions are the major ones (MELCA-Ethiopia, 2011).

1.3. Factors Affecting Agro-biodiversity

Farmer varieties are highly valued by local producers for their useful agronomic traits and give sustainable yield in the diversified agro-ecological conditions of the country where improved varieties fail to perform satisfactorily. However, farmers' varieties are highly affected by many factors that have been affecting agro-biodiversity in Ethiopia. Those factors associated with many issues among which policy; institutional arrangement/frame works, market, and climate change are the major once. Under each factors there are different issues associated with. For example, to address the growing demand for food, the country's extension service gives emphases more on a high yield varieties even in areas where farmers varieties are better suited.
That means the emphases associated with mono-cultural expansion with uniform high-yield hybrid crops are found to be reductionist in nature with respect to species diversity and have adverse effects on the biotic and structural complexity at the landscape level (CBDC, 2009).

The mono-cultural expansion mainly been promoted by agricultural strategies and programs that were designated to increase food production, in response to socio-economic conditions related to the growing population’s food demand and reduction of poverty among the rural poor has been highly affect the available options for farmers and sustainable production of farmers variety.

Population growth coupled with poverty, the commercialization of agriculture, changes in consumption patterns, conversion to modern and high-input agriculture, and globalization of agricultural markets are threatening agro-biodiversity in Ethiopia causing a rapid loss of agricultural biodiversity and wild crop varieties (Fassil, 2010).

Our farmers are also victims of climate change, an issue of global community. Attributes of climate change affecting the Ethiopian farmers and productivity of agriculture including late rains, prolonged dry spell or moisture stress, flooding, wheat rust ((MELCA-Ethiopia, 2011). Displacement of farmers’ varieties by hybrid and market oriented crop production, climate change and diseases, pests, and invasive species such as Parthenium hysterophorus highly affect agro-biodiversity (IBC, 2012).

Further, land degradation, deforestation, habitat conversion and the consequent loss of wild lands which harbor wild relatives, and the replacement of farmers’ varieties with hybrid high yielding varieties pose impact on agro-biodiversity mainstreaming due to lack of policy incentives/support and provision of extension service.

On the other hand, the inability of the market to price agro-biodiversity conservation values into production systems and the failure of the financial sector to recognize crop system diversification as an asset pose impact on mainstreaming agro-biodiversity in the country.

The problem is also related to erosion of farmers’ time tested knowledge of local variety crop management. Mainstreaming and conservation of farmers’ varieties is affected due to the loss of related traditional knowledge and management system.
1.4. Rationale for Agro-biodiversity Mainstreaming

Ethiopia is known to be a center of origin especially for crops like teff and sorghum, and center of diversity for crops like durum wheat and barley. The genetic diversity and variety of Ethiopian coffee on the other hand is mirrored by the great varieties and attractiveness of its flavors and tastes and this can indeed make Ethiopian coffee a crop that is well suited for mainstreaming biodiversity approach.

Furthermore, it is only in nature that plant diversity at genetic, species and ecosystem levels can be maintained in the long term. Indeed, agro-biodiversity exists as a result of human interaction with plant species and the landscape via agricultural systems over very long periods of time. Interaction of farmers’ varieties with crop wild relatives is particularly important in allowing a greater proximity-mix of crops, increasing the productivity of the mixing of genes, and hence the potential for new varieties to emerge. These wild varieties contain a great deal of genetic diversity necessary for survival, and although they have low yield capacity, their proximity to cultivated cousins allows for genetic traits to pass back and forth from weedy to crop varieties, further facilitating a rich diversity of genetic possibility in the adaptation of new varieties and the maintenance of existing genetically diverse varieties (Fassil, 2010).

Moreover, formerly farmers have a coping mechanism to different natural disasters by planting different varieties at different farming seasons: if they face failure in one variety type, they have an option of trying the other one. These kinds of available options are not possible with the current situation which depend more on improved hybrid varieties. Ethiopian farmers practice complex patterns of farming which may involve the cultivation of many crops and varieties on the available land to maximize the use of land and available resources and meeting household food requirements throughout the year while still having some marketable surplus. In addition it is meant to minimize the risks associated with farming. Besides yield and minimizing risks, factors like grain quality for local food and beverages, storability, suitability for intercropping and the use and value of crop residues may all influence farmers’ varietal choices. Farmers perceive that local varieties are more adaptable to their agro-ecology, give stable yields and good grain quality, perform better under low input and poor soil condition, and are suitable for the preparation of traditional foods.

Where small scale traditional farming and huge diversity in agro-ecosystems characterize the farming system, availability of diversity in crop varieties that fit the range of agro-ecosystems
is the primary decisive factor. Hence, farmers' varieties are the main actors to fitting such on farm diversity and the range of agro-ecosystems.

Therefore, mainstreaming agro-biodiversity into agricultural production system in Ethiopia is fundamental to effective transition towards sustainable agricultural production system and to ensure the availability of different farmers' varieties to farmers so that they will have options fitting in to the diverse agro-ecologies and farmers' knowledge. Farmers' varieties are also more preferred due to a number of reasons including their qualities in pest resistance, drought, and frost tolerance, and are key factors that allow traditional farmers to continue to develop and maintain agro-biodiversity. In addition to the crops, farmers' varieties are the ones that best fit the multi-purpose need of farmers like use of animal feed, construction, and fuel. It also contain the taste, nutritious and medical value that best fit the interest of the farming communities and are the potential for environmentally friendly organic production systems.

The dependency on agriculture again, makes the conservation and sustainable utilization of agro-biodiversity crucial item in the country's development agenda. This is, because, the economy of Ethiopia is mainly depend on agriculture and the country is signatory to the CBD through compliance to article six requirements of the document. This also obliged the country those provisions that require integrating agro-biodiversity concerns into mainstream development. Again, recent studies undertaken concluded that agro-biodiversity will only be maintained if the country mainstreams agro-biodiversity conservation into production systems and farmers' varieties through strategies that simultaneously promote food production and biodiversity conservation, where there is a huge absence of this system in the country (Fassil, 2010). Hence, integrating agro- biodiversity concerns into national policies, and strategies with relevant sectors in the country should be given due attention and considered as top priority.
2. OBJECTIVE OF THE STUDY

2.1. General Objective

The overall objective of the study is to identify gaps and formulate recommendations on policies, legislatives, strategies, and institutional frameworks that have impacts on mainstreaming agro-biodiversity in to the agricultural production systems of Ethiopia.

2.2. Specific Objectives

- To identify gaps of policies and institutional frameworks in relation with agro-biodiversity mainstreaming in the agricultural systems of the country;
- To provide possible and practical recommendations that can able to fill the gaps with policies and institutional frameworks towards mainstream agro-biodiversity in the agricultural systems;
- To propose the possible approach and methods to advocate/lobby and influence government actions for the adoption of recommendations into the existing policies, legislatives and plans.

3. SCOPE OF THE STUDY

This study is mainly focused on the reviews of existing policies, strategies, and legislations of key stakeholders and information gathered through discussion forums. As this study is expected to come up with findings and recommendations pertaining to the present state of mainstreaming agro-biodiversity in the farming systems of the country, it will contribute to the timely action on agro-biodiversity, farmers’ varieties and resolve policy gaps.
4. METHODOLOGY

The study, within the scope, has attempted to critically analyze policies, legislations, strategies, and institutional frameworks of key stakeholders with regard to mainstreaming agro-biodiversity conservation into the farming systems of Ethiopia. In this regard the method employed to carry out the review of policies mainly depends on investigating the existing documents and gathering information from key stakeholders through discussion forums. Policy documents were reviewed and summarized in such a way under the guidance of United Nations Development program (UNDP) and Ethiopian Biodiversity Institute. Policies, rules, and regulations relevant to agro-biodiversity such as biodiversity, environment, forestry, agriculture, trade, investment, and industry including the respective strategies, and institutional frameworks were reviewed and analyzed. Moreover, gaps and challenges to mainstream agro-biodiversity were identified.

In view of achieving the objectives indicated above, the study was carried out using the following methods:

- Review and analysis of agricultural policy, strategies and institutional frameworks regarding mainstreaming agro-biodiversity and agricultural extension services while identifying gaps on the existing farming systems;
- Review and analysis of biodiversity policy, strategy, legal and regulatory frameworks regarding mainstreaming agro-biodiversity in the conservation and production systems;
- Review and analysis of environmental policy, legislation and institutional frameworks and environmental organs regarding the identification of gaps in agro-biodiversity conservation;
- Review and analysis of the convention on biological diversity with respect to country’s obligation on the conservation of agro-biodiversity;
- Review and analysis of forest policy, legal and institutional frameworks to identify gaps with regard to agro-ecological conservation systems;
- Review and analysis of national trade policy, legislation and institutional frameworks regarding the identification of gaps in the trading and marketing systems of farmers’ varieties;
- Review and analysis of national industrial policy regarding the integration of farmers’ varieties into the industrial production systems;
• Review and analysis of the national investment policy regarding identifying gaps in the attraction of investment with farmers' varieties and agro-biodiversity issues;
• Identification of gaps with legislation and institutional frameworks with regard to Ethiopian commodity exchange on agricultural commodities system whether farmers' varieties are included and considered;
• Forwarding possible and practical recommendations that would contribute towards mainstreaming agro-biodiversity conservation into the farming systems, policies, and strategies of key stakeholders and research systems in Ethiopia.
5. RESULTS AND DISCUSSION

Degradation and loss of biodiversity is largely caused by activities carried out mainly in sectors such as agriculture, forestry, trade, and industry. One measure of addressing such biodiversity loss is integrating the conservation and sustainable use of biodiversity into policies, laws, strategies and activities of all sectors. Accordingly, the Convention on Biological Diversity (CBD), under its article 6, requires countries to develop national strategies, for the conservation and sustainable use of biodiversity and integrate them into policies, and programs. Ethiopia signed the CBD in 1993 and ratified it in May 1994 (Proc. 98/1994). In line with this, considerable efforts are under way in the country to prepare national communications regarding CBD reporting modalities.

The CBD defines the ecosystem approach as: “a strategy for the integrated management of land and living resources that promotes conservation and sustainable use in an equitable way with the objectives of conservation of biological diversity, sustainable use of biological diversity components and fair and equitable sharing of the benefits arising out of the utilization of genetic resources, including appropriate access to genetic resources and transfer of relevant technologies, taking into account all rights over those resources and to technologies, and by appropriate funding”. This paragraph has positive connotation for agro-biodiversity in particular and biodiversity conservation in general to signatory countries such as Ethiopia. In accordance with CBD objectives, integrating agro-biodiversity into national and regional policies, plans, and legislation that govern agriculture, trade, industry, biodiversity and forestry has become important issue in Ethiopia.

5.1. Biodiversity Policy, Legal, and Institutional Frameworks

5.1.1. International agreements and treaties

Ethiopia is party to major international agreements governing the conservation and sustainable use of biodiversity such as Convention on Biological Diversity, the International Treaty on Plant Genetic Resources for Food and Agriculture and the Cartagena Protocol on Biosafety. Besides, there are principal global international agreements related to wildlife with the exception of Ramsar Convention that has not yet ratified (Table 1).
Table 1. Biodiversity related international agreements ratified by Ethiopia

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<thead>
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<th>No</th>
<th>International Agreements</th>
<th>Year of Ratification</th>
<th>Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Convention on Biological Diversity (CBD)</td>
<td>1994</td>
<td>• Conservation and sustainable use of biodiversity components, as well as the fair and equitable sharing of the benefits arising out of the utilization of genetic resources.</td>
</tr>
<tr>
<td>2.</td>
<td>Nagoya Protocol</td>
<td>2012</td>
<td>• Access to genetic resources and their fair and equitable sharing of benefits arising from their utilization</td>
</tr>
<tr>
<td>3.</td>
<td>World Heritage Convention (WHC)</td>
<td>1977</td>
<td>• Identification and conservation of sites of outstanding universal value from a natural or cultural point of view, to be included in the World Heritage List</td>
</tr>
<tr>
<td>4.</td>
<td>Convention on International Trade in Endangered Species (CITES)</td>
<td>1989</td>
<td>• Ensure that international trade in specimens of wild animals and plants does not threaten the survival of the species, requiring the establishment of a permit system for certain imports and exports.</td>
</tr>
<tr>
<td>5.</td>
<td>Convention on Migratory Species (CMS)</td>
<td>2010</td>
<td>• To conserve terrestrial, aquatic and avian species throughout their range of migration.</td>
</tr>
<tr>
<td>6.</td>
<td>Agreement on the Conservation of African-Eurasian Migratory Water birds</td>
<td>2010</td>
<td>• To conserve African-Eurasian migratory water birds</td>
</tr>
<tr>
<td>7.</td>
<td>Ramsar Convention on Wetlands</td>
<td>Not ratified</td>
<td>• Promote conservation of wetlands/waterfowl habitats</td>
</tr>
</tbody>
</table>

i) Convention on biological diversity and convention on combating desertification

The CBD provides a broad and comprehensive framework for the conservation and sustainable use of biodiversity. CBD has the objectives of ensuring the conservation of biological diversity, the sustainable utilization of its components, and the fair and equitable sharing of the benefits arising out of its utilization (art 1). It seeks to realize its objectives (indicated in Table 1 and
article 1 of the convention) through national measures and international cooperation to integrate it into the relevant sectoral policies, strategies and programs (art. 6). Furthermore, CBD sets out the specific measures of biodiversity conservation \((in-situ\) and \(ex-situ\)) which country should implement and put in place a regulatory framework to protect threatened species and populations (art. 8) as well as the need to support local communities to develop and implement remedial action in degraded areas (Art. 10). All these are helpful to conserve biodiversity including agro-biodiversity.

Convention on combating desertification (CCD), on the other hand, provides an integrated conservation approach so as to ensure sustainable production. The objective of this convention is to combat desertification and mitigate the effects of drought in countries experiencing serious drought and/or desertification, particularly in Africa, through effective action at all levels, supported by international cooperation and partnership arrangements, in the framework of an integrated approach, with a view to contributing to the achievement of sustainable development in affected areas. It is also indicated that this objective will involve long-term integrated strategies that focus on improved productivity of land, and the rehabilitation, conservation and sustainable management of land and water resources, leading to improved living conditions, in particular at the community level. In order to achieve the objective of this convention it is indicated that, the parties should ensure that decisions on the design and implementation of programs to combat desertification and/or mitigate the effects of drought are taken with the participation of populations and local communities and that an enabling environment is created at higher levels to facilitate action at national and local levels. It is therefore, this convention is relevant in the conservation of agro-biodiversity in an integrated approach to improve community livelihood through the conservation of farmers' varieties.

ii) The international treaty on plant genetic resources for food and agriculture

The international treaty on plant genetic resources for food and agriculture, which was adopted in November 2001 and entered into force in June 2004, is an international instrument which specifically deals with agro-biodiversity. The objectives of the treaty are the conservation and sustainable use of plant genetic resources for food and agriculture and the fair and equitable sharing of the benefits arising out of their utilization for sustainable agriculture and food security (Art.1). The treaty promotes the efforts of farmers and local communities to manage and conserve plant genetic resources on farm; and including \(in-situ\) conservation of wild crop...
relatives and wild plants for food production (Art. 5) that allows countries to promote research for maximizing intra and inter specific variation for the benefit of farmers. The treaty strengthen expansion of locally adapted crop varieties and under-utilized species; support the wider use of diverse varieties and species in on-farm and create strong link between plant breeding with agricultural development (Art. 6). Ethiopia is party to the CBD and the international treaty and has ratified international treaties and these shall be part and parcel of the laws of it as stated in Ethiopian Constitution (Art 9.4/1995). However, the implementation of these international treaties in the country is found to be limited mainly due to lack of enabling legislations, strategies, and implementation mechanisms.

5.1.2. Biodiversity related national policies and strategies


i) National biodiversity policy

The National Biodiversity Policy of Ethiopia (1998) aims to ensure the appropriate conservation and utilization of the country's biodiversity. The specific biodiversity objectives, strategies, and directions aimed to the conservation and sustainable use of genetic resources to the benefit of local communities. It states the directions as to: explore, collect, conserve, evaluate and arrange for utilization of the country's biodiversity; integrate into the education system; survey, document, assess, study, improve and utilize genetic resources and traditional knowledge; involve communities in the making of decision concerning their genetic resources and traditional knowledge and in the sharing of benefit from the utilization thereof; integrate biodiversity policy with other sectoral policies (Art. 3).

The biodiversity policy, in its preamble, makes specific reference to agro-biodiversity. It states that the agro-biodiversity resource of the country is threatened by irreversible loss and hence the need to take action to ensure the conservation and rational use. Nevertheless, in its substantive parts, it does not provide the policy directions specific to agro-biodiversity. It does not stipulate
strategies specific to the conservation and sustainable use of agro-biodiversity in general and the mainstreaming of agro-biodiversity into policies, strategies, and plans into other related sectors.

ii) National biodiversity strategy and action plan

The national biodiversity strategy and action plan (NBSAP) identify the biodiversity goal, strategic objectives and action plan of the country. NBSAP identifies four strategic objectives that define the highest priorities for biodiversity conservation to Ethiopia, and 23 specific objectives which are supported by one or more actions.

Agro-biodiversity is one of the four strategic objectives of NBSAP, which includes the need to mainstream agro-biodiversity into policies and plans. The agro-biodiversity strategic objective of the country is stated to be the effective conservation of the rich agro-biodiversity of the country through mix of in-situ and ex-situ strategies. Owing to this the NBSAP is focused on the conservation of biodiversity in ways that help improve the livelihood of the community through the conservation of agro-biodiversity and farmers varieties at local and national levels. However, the issue in the conservation and mainstreaming of agro-biodiversity is not stated specifically.

5.1.3. Legal and regulatory frameworks

The law governing the conservation and sustainable use of biodiversity is not found in one piece of legislation, but in various cross-sectoral and sectoral laws. A brief review of the major laws in Ethiopia relevant to the conservation and sustainable use of biodiversity and agro-biodiversity are described subsequently.

i) Constitution

The Constitution of the Federal Democratic Republic of Ethiopia (1995) lays down the basic frameworks and principles governing the conservation and sustainable use of the environment and natural resources, including agro-biodiversity (Art. 40, 89 and 92). The Constitution specify that the right to ownership of rural land as well as of all natural resources is exclusively vested in the state and the people of Ethiopia. It provides for the devolution of natural resources administration to lower levels.
ii) Access to genetic resources and benefit sharing

Ethiopia has enacted a law that regulates access to genetic resources, traditional knowledge, and community rights (Proc.482/2006). The law applies to access to genetic resources (including derivatives) found in ex-situ or in-situ conditions and the traditional knowledge associated there with. The important feature of this law is that it has integrated concerns of biodiversity conservation and sustainable use of its components with the consideration of community knowledge. It provides that access may be denied/ restricted/suspended/revoked under circumstances where it affects the conservation and the sustainable use of biodiversity. It stipulates that access to genetic resource may be denied where, poses a danger of loss of ecosystem, and has undesirable adverse impact on the cultural practice of local communities or the environment (Art. 11). In addition, it recognizes the inalienable rights of communities to use their genetic resources and community knowledge (Art 8). Moreover, the law provides that the benefits arising from the utilization of genetic resources and community knowledge shall be shared to the country and the concerned local communities.

This law has incorporated concerns of biodiversity conservation and recognizes the absolute rights of communities to use their genetic resources and the right to share from the benefit arising from the use thereof contributes to the sustainable use of biodiversity and consequently food security and livelihood. The prohibition or restriction of access to genetic resources in cases where it poses danger to genetic resources and/or ecosystem can also be contributes to the conservation of agro-biodiversity.

The proclamation applies to genetic resources found under both in-situ and ex-situ conditions and community knowledge, but does not restrict customary use and exchange of genetic resource and community knowledge by and among local communities. Communities have the right to have prior informed consent for access to their community knowledge and genetic resources. This right goes to the extent that communities can demand the restriction or withdrawal of the prior informed consent made by the competitive authority; in cases such an arrangement affects their socio-economic life or their natural or cultural heritages (Art. 7.1c-d). This law is relatively smart to conserve agro-biodiversity but the implementation at grass root level needs more effort and work.
According to the constitution, the management of natural resources is shared between the federal government and regional states which, the federal government having the power to enact laws governing the utilization and conservation of land and other natural resources (Art. 51(5)), and regional states the power to administer natural resources in accordance with the laws issued by the federal parliament (Art. 52(2/d)).

EB1 is the lead technical institution responsible for the conservation and sustainable utilization of the county's biodiversity resources, including agro-biodiversity. IBC was established by proc. 120/1998 and amended by proc. No 381/ 2004, with the objective to ensure the proper conservation and sustainable utilization of the county's biodiversity resources. In line with this, EBI has the powers to, among other things, initiate policy and legislative proposals on the conservation of biodiversity; explore and survey the diversity and distribution of the country's biodiversity resources; ensure the conservation of the country's biodiversity using in-situ and ex-situ methods; develop strategy for the conservation of all forms of biological resources; formulate policy ideas that promote processes that enhance the existence of biodiversity and control processes that threaten biodiversity; develop systems and technical standards for the conservation of the country's biodiversity; issue directives on the collection, dispatch, and export of genetic materials from the country; and give permit for those who need to access genetic materials from the country (Proc. 381/2004 art.6).

The role of EBI in the conservation of agro-biodiversity is obvious and huge. Its mandate on the sustainable use of agro-biodiversity, however, appears to lack clarity, as there is no specific mandate listed concerning agro biodiversity, in its proclamation. However, EBI has a mandate to formulate policy ideas that promote processes that enhance the existence of biodiversity and control processes that threaten biodiversity; and develop systems and technical standards for the conservation of the country's biodiversity. This mandate is so relevant to processes mainstreaming of agro-biodiversity into other sectors and play the role of its conservatio

The mandate of EBI to ensure the implementation of the biodiversity policy at regional and district level is not clear. This is, because, there is no independent institutional working structure up to lower level. The mandates vested to Regional Bureau of Agriculture overlaps. The institute did not answer the question “who is responsible for agro-biodiversity conservation at lower hierarchy.” EIB does not have a clearly defined strategy as to how ensuring the
mainstreaming of agro-biodiversity into policy and plans in other sectors. Currently EBI is working to extend its mandate to woreda level via establishing departments and/or case teams in regional bureaus of agriculture. This will enhance mainstreaming of agro-biodiversity into agricultural production systems.

5.2. Environmental Policy, Legal, Regulatory and Institutional Frameworks

5.2.1 Environmental policy and climate resilient green economy strategy

i) Environmental policy

Environmental Policy of Ethiopia (1997) provides for the policy framework for the sustainable management and utilization of the country’s natural resources. This Policy aimed to promote sustainable social and economic development of the country through sustainable management and utilization of the natural, man-made, and cultural resources in the country. The specific objectives of the policy include, *inter alia*, ensuring that essential ecological processes and life support systems, biological diversity and renewable natural resources are conserved, developed, and utilized in a sustainable manner.

Section 3.2 of this policy describes the policies on the conservation and sustainable use of forest resources and recognizes the integration of forestry concerns with other sectors. Section 3.3 entails the need of integration of biodiversity conservation with activities in other sectors. It stipulates that forestry development strategies should integrate the development, management, and conservation of forest resources with those among others, land, ecosystems and genetic resources, as well as with crop production.

The environmental policy promotes the conservation and sustainable utilization of biodiversity and agro-biodiversity. It provides a foundation conducive to formulate and implement a comprehensive policy that promotes the conservation and sustainable utilization of biodiversity and agro-biodiversity. Relevant to mainstream in particular, it clearly stipulates that the conservation of biological diversity outside the protected area system needs to be integrated with strategic land use plans, local level plans and sustainable agricultural and pastoral production strategies. This provides a concrete foundation to integrating biodiversity conservation into other sectors.
ii) Climate resilient green economy strategy

The Ethiopian government through the Environmental Protection Agency (EPA), currently known as Ministry of Environment and Forest (MOEF) initiated a Climate-Resilient Green Economy Strategy (CRGE) initiative to protect the country from the adverse effects of climate change and to build a green economy. The Strategy was officially launched in the year 2011 with aims in building a climate resilient green economy by the year 2025. In doing these, the strategy has identified six sectors for green economy (under mitigation) and adaptation addressing both adaptation and mitigation objectives. Agriculture is one of the sectors identified both under mitigation and adaptation efforts. CRGE strategy is based on four pillars of which two of them are directly focused on crops and forests put as:

- Improving crop and livestock production practices to increase food yields, hence food security and farmer income, while reducing emissions;
- Protecting and re-establishing forests for their economic and ecosystem services, including as carbon stocks.

This strategy can have significant contribution in the conservation of agro-biodiversity and ecosystem as a whole and to ensure sustainability in agriculture sector and to improve livelihood.

iii) Environmental impact assessment law

Environmental Impact Assessment (EIA) is one important tool to ensure development plans in other sectors shall not cause impact on the conservation and sustainable use of biodiversity. It provides the system whereby the environmental effects of projects and public instruments (policies, strategies, programs, laws, or international agreements) are predicted and managed in advance. Accordingly, the Ethiopian government issued an environmental impact assessment law (Proc.No. 299/2002) that prohibits the commencement of proposed projects without EIA approval by authorized body and encourages public participation to comment the report. Any license agency shall, prior to issuing an investment permit or a trade or an operating license for any project, ensure that the responsible agency has authorized its implementation and approval of an environmental impact study report does not exonerate the proponent from liability for damage(Art. 3 (3/4). EIA law therefore, is one major tool in the conservation of biodiversity and can help to consider the issue of agro-biodiversity.
iv) Biosafety law

The Government of Ethiopia introduced a Biosafety legislation (Proc. No. 665/2009) in order to protect the human and animal health as well as the wellbeing of the environment and socio-economic conditions of the country from the risk that may arise from Genetically Modified Organisms (GMO). The Biosafety law has the objective to protect the human and animal health and the wellbeing of biodiversity and local communities as well as the environment of the country. This has positive contribution to conserve and sustain agro-biodiversity through protecting harms from GMO.

5.2.2 Institutional Frameworks

i) Environmental Protection Organs

Proc. No. 295 of 2002 provides for the establishment of Environmental Protection Organs which include EPA, Regional Environmental Bureaus, and Sectoral Environmental Units. EPA has mandates, among other things, to coordinate the measures that ensure the realization of the environmental objectives and basic principles provided for in the constitution and the environmental policy of the country; prepare environmental policies, strategies and laws, and monitor their implementation; promote the formulation of environmental protection action plans and projects; and establish a system for environmental impact assessment. To the benefit of biodiversity, EPA has also mandated to formulate policies and laws on the development, importation, handling, and utilization of genetically modified organisms and alien species (Art.6).

The environmental protection organs proclamation requires each regional state to establish or designate its regional environmental agency with the responsibility among others, to coordinate the formulation, implementation, review, and revision of regional conservation strategies; ensure the implementation of federal environmental standards and issue regional standards (Art.15). In this regard, all regional states and city administrations established their own bureaus. These organs both the federal and regional have invaluable contribution in the conservation and sustainable utilization of agro-biodiversity through mechanisms like environmental impact assessment, forest development, and ecosystem management.
5.3. Forest Policy, Legal and Institutional frameworks

5.3.1. Forest policy

Conservation and sustainable utilization of forests plays a decisive role in ensuring the participation of, and benefit sharing by the concerned communities as well as by harmonizing forest policies and programs with those of other economic sectors, particularly with agriculture policy. Consequently, great contributions towards minimizing loss of biodiversity, soil erosion, ecological disturbance and enhance agricultural production can be achieved.

Forest development strategies provides for, *inter alia*, pursuing agricultural and other policies and programs that will reduce pressure on agricultural ecosystems; promoting changes in agricultural and natural resource management systems which will limit free grazing of animals; and finding substitutes for construction and fuel wood in order to reduce pressure on forests in particular and biodiversity in general. This policy and strategy therefore, have positive impact on the conservation of agro-biodiversity, watershed, and ecosystem management that can contribute to agricultural production.

5.3.2 Forest conservation laws

The conservation and sustainable use of forest resource in the country at present is regulated by “forest development, conservation, and utilization proc. No.542/2007.” that recognizes the fact where the rampant deforestation occurring in the country at the moment has exacerbated soil erosion, expansion of desertification, disturbance of ecological balance, depletion of biodiversity, and reduction of agricultural production in the country. It also recognizes the importance of community participation and benefit sharing by local communities and the harmonization of forest policies and programs with those in other sectors particularly agriculture. This law provides the use and importance of agro-forestry and technical support to farmers in the selection and planting of tree and forage plant species and conservation that help to prevent soil erosion and is relevant towards the conservation of agro-biodiversity.

5.3.3 Institutional framework

Environmental Protection Agency has the responsibility to ensure the implementation of the forest proclamation by coordinating the relevant federal and regional bodies and rendering the
necessary technical assistance to the development, conservation and sustainable use of forest resources; and administer state forests that have national or international significance, inter-regional forests which regions couldn’t properly administer with agreement and forests which regions called upon it to administer. As the ministry is organized as new ministry incorporating forest by taking over the mandate and authority from the MOA, this study was not able to discuss the relation with regional responsible bodies in the management and conservation modalities. However, the ministry is relevant to the conservation and sustainable use of biodiversity and agro-biodiversity such as coffee forests.

5.4. Agricultural Policy, Legal and Institutional Frameworks

Ethiopia has a consistent set of policies and strategies for agriculture and rural development that reflect the importance of the sector with the policy framework based on the concept of agricultural development lead industrialization (ADLI). ADLI is an economy and society wide strategy in which agriculture has a central role. It envisages an economically transformed society within which agriculture will grow rapidly.

5.4.1 Agricultural policy

ADLI (1994) was issued as long term development strategy to facilitate the development of a free market economy in the country. Following ADLI, the Rural Development Policies and Strategies (RDPS, 2002) aims to transform the current subsistence farming into market oriented/commercial production system through identifying key strategies to realize rural development while sustainable use and management of natural resource as one of the strategies to promoting agricultural development. RDPS stipulates the policy of agricultural research of the country, which is framed based on the agricultural development policy. Accordingly, it requires the agricultural research of the country to focus on adapting/generating technologies that enable the production of marketable agricultural products focusing on crops that can make the country competitive on the international market.

The policy envisages the transfer of technology to farmers through extension service, short training and demonstration, extension service being the main way of technology transfer (RDPS, 2002, p.60-65). RDPS underlines the vitality of the establishment of a strong extension service system. To this end, it states a policy of placing three college level trained extension agents in each
rural kebele, to be supported and guided by senior extension professionals, in order to enhance the existing extension service and provide same at closer reach.

The agricultural policy is aimed to increase agricultural production and productivity through enhancing the use of high yielding technologies (high yielding varieties, chemical fertilizer, and agro-chemicals) and practices so as to respond food security issues. However, these have negative impact on agro-biodiversity through continued accelerated genetic erosion of farmers’ variety. For instance, the increased utilization of improved durum wheat varieties coupled with the use of high dose of fertilizer in Ada’a district has resulted in substantial reduction of farmers verities (durum wheat) leading to high genetic erosion (Bayush and Berg, 2007).

Although promoting wise use and management of land as one of the strategies of agricultural development is a positive trend in that it somehow contributes to the conservation and sustainable use of agro-biodiversity, the issue of agro-biodiversity conservation was not articulated well. The potential of agro-biodiversity towards food security and maximizing income were not considered enough. However, it has positive contribution in establishing the program and integrating in the structure of agricultural extension services to contribute and mainstreaming the conservation of agro-biodiversity in the farming systems of the country.

i) Agricultural extension services

Agricultural extension service is viewed as the major support to be provided by the government in transforming the country’s agriculture from subsistence to market based production system and the government has demonstrated strong commitment to agriculture through allocations of more than 10 percent of the total annual budget of the country. The presence of trainings to produce development agents in fields of crop science, animal science, natural resource management, and cooperative development at the Farmers Training Centers (FTC) has significant role to enhance and mainstream agro-biodiversity conservation. This is proved to be beneficial in particular into the extension package through the extension implementation processes. Such may be soil fertility mechanisms (practices) such as compost making, and better yielding land races and their management practices. It is therefore, the existence of agricultural extension service at the reach of farmers can contribute a lot in mainstreaming and conservation of agro-biodiversity.
5.4.2. Legal and regulatory frameworks

In order to promote sustainable agro-biodiversity use, MoA has the responsibility to direct and regulate the production and marketing of organic agricultural products, forest products, and applied researches. In this respect, the ministry has mandates to, \textit{inter alia}, issue directive on the standards of organic agricultural production; establish organic agricultural products council and defines its mandates; enhance extension services and training programs that promote production of organic products; and take measures necessary to get accepted the organic products of the country on international markets (Proc. No. 488/2006, art 7).

\textbf{i) Organic products law}

With the consideration of organic agricultural production and hence supplying organic products to international markets, the government introduced a law (The Ethiopian Organic Agriculture System Proc. No 488/2006) which provides the system for the production, processing and distribution of organic agricultural products. The law requires a producer to register with the inspection and certification body and comply with the rules of organic products inspection and certification. Organic production system is found to be a good opportunity in mainstreaming and conservation of agro-biodiversity as well as to have international market links/options.

\textbf{ii) Agricultural products marketing law}

To establish an efficient, fair and transparent agricultural commodities marketing system, the government introduced trading system called commodity exchange, by proc. No 551/2007 as a mechanism to exchange where standardized commodity-linked contracts are traded (Art. 2(4)). The commodity exchange system was established to remove market bottlenecks and creates fair and efficient trading system and intended to provide a reliable system for handling, grading and storing of agricultural products. The commodity exchange has been officially launched in April 2008 working on exchange of maize, wheat, and haricot beans, but since June 2009, became focused and remains with coffee and sesame seeds into the system. The responsible body in managing this system is the Ethiopian Commodity Exchange. This commodity exchange system is found to be positive to create market linkages for farmers’ varieties and hence in the contribution of the conservation of agro-biodiversity.
iii) Plant Breeders' right law

The government enacted a law, Plant Breeders' Right proc. No 481/2006 which provides for the protection of plant breeders' right. The plant breeders' right provided entitles the holder an exclusive right to sell, including the right to license other persons to sell, plants or propagating material of the protected variety; and the exclusive right to produce, including the right to license other persons to produce, propagating material of the protected variety for sale.

It recognizes the rights of farmers to: save, use, exchange and sell farm-saved seed/propagating material of farmers' varieties; use protected varieties including material obtained from gene banks or plant genetic resource centres to develop farmers' varieties.

The recognition of farmers' right to use new plant varieties protected by plant breeders' right in line with the established traditional practice of seed exchange among farmers in Ethiopia contributes to the conservation and sustainable use of plant genetic resources. Moreover, farmers' role and activities are strongly linked to the existence of high crop diversity in Ethiopia and their varieties serve as major sources of planting materials (Regassa, 2006). The existence of this law can play significant role in the safeguarding of farmers’ varieties in particular and conservation of agro-biodiversity in general.

5.4.3. Institutional framework

The Ministry of Agriculture (MOA) formerly MoARD re-established by proc. No 380 of 2004, has received the overall responsibility to promote the expansion of rapid and sustainable agricultural in the country. In addition, MoA has the responsibility in the management of natural resources with the exception of forest resources is relevant to the conservation of biodiversity in general and agro-biodiversity in particular. Capacity building for marketing of agricultural inputs and ensuring the creation of export market for agricultural products through market led agricultural development and creation of enabling environment for the expansion of cooperatives and the provisions of credit facilities are also due responsibilities. With these responsibilities the ministry is found to play the leading role in mainstreaming agro-biodiversity into the production and marketing systems of agriculture. Hence, conservation of agro-biodiversity, integrating climate change adaptation considerations and ensure sustainable agriculture.
At regional government level, Bureau of Agriculture is the responsible body for the agriculture sector including the conservation and sustainable use of biodiversity and natural resources. For example, in Oromiya and Amhara regions, Bureau of agriculture are mandated to conserve and develop biodiversity emphasizing on species (wildlife, bird, and genetic resources in general) exposed to extinction; and conserve or cause the conservation of biodiversity and natural antiquities and supervise their utilization.

Moreover, Regional states have established their own regional agricultural research institutes which are responsible to undertake agricultural research on agricultural problems specific to their respective regions (Proc. No. 79/1997 (Art. 6 (17) and (18)). These regional research institutes are counter parts of the federal Ethiopian Institute of Agricultural research (EIAR) at regional levels and are relevant to agro-biodiversity conservation.

As the MOA and regional agricultural bureaus are fully responsible in the development of the sector they are found to be the key to take the responsibility of mainstreaming of agro-biodiversity into the agricultural production systems too. Research institutes can also play significant role in conducting research in the conservation of agro-biodiversity and productivity of farmers’ varieties.

5.5. Trade, Industry and Investment Policy and Legal and Institutional Frameworks

5.5.1 Trade and Industry Policy

The Industrial development policy (2002) of Ethiopia aims to increase the share and benefit of the country from global trade. The policy gives priority to industrial sectors that manufacture quality and competitive products for world market. It gives special focus for textile and garment, meat and leather products industry, agro-processing industry, construction industry and medium and small manufacturing. Furthermore, the policy identifies the measures required to facilitate industrial development in the country.

The major measures are creating conducive situations for industrial development and provide support to private investors. In terms of creating conducive situations, the policy proposes to create conducive financial system, and building key infrastructure necessary for industrial development and circulation of industrial raw materials and products. The private sector support focuses mainly on improving the regulatory environment; grab export market
opportunities; increasing production of export products. In this policy the role of agro-biodiversity for agro-processing is not explained in clear manner. Market promotion activities and a value addition to farmer’s variety should be carried out by this sector.

The Industry policy gives priority to production of goods for world market and the trade related therewith. This directs available resources and government support to these priority production and trade sectors, consequently less attention to the development of industry in the other remaining sectors. Targeting agro-processing Industry and exportable agricultural products in agriculture sector is good opportunity to enhance agro-biodiversity especially producing organic coffee. But nothing stated how quality agricultural product would be produced by enhancing agro-biodiversity. This sector mainly targets reducing unemployment and increasing economic growth with giving much emphasis to natural resource management.

i) Industry development strategic plan

The industry sector aspired to realize growth and development of the country through integrating the industry and the agriculture. The agro-processing industries by processing the cereals that are widely produced in the country could produce corn oil, methane, starch and corn flax with competitive price and quality. These are dominantly controlled by big companies in the international market. There is a need to create a situation in which the domestic investors could work jointly with foreign companies. To reap the benefit from the sector the domestic and foreign investors should be supported and encouraged so that they could go in to investment. However, creating enabling condition might have impacts on agro-biodiversity unless feasibility study is made.

The other item that is given special focus in the agro-industry sector is to selling of processed which has an add value. For instance, to get benefits from of processed coffee, there is a need to encourage both foreign companies and domestic investors. But, the plan did not indicate how to keep the benefits of producers/farmers to supply quality raw materials. Furthermore, the sector should motivate the farmers by means of market promotion and capacity buildings as incentive.

Accordingly the national development plan, in GTP, aimed to increase the share and the benefits earned (gained) from the global economic integration with an ultimate goal of becoming an industrialized country. In this regard, the industrial development strategy
formulated by the government clearly articulates the fundamental principles and directions in order to ensure accelerated and sustained industrial development in the country.

The Industrial development policy (2002) of Ethiopia aims to increase the share and benefit of the country from global trade. The policy gives priority to industrial sectors that manufacture quality and competitive products for world market. It gives special focus for textile and garment, meat and leather products industry, agro-processing industry, construction industry and medium and small manufacturing. Furthermore, the policy identifies the measures required to facilitate industrial development in the country.

This policy identifies measures those required to facilitate industrial development as; creating conducive situations for industrial development and provide support to private investors. However, the role of agro-biodiversity for agro-processing such as market promotion activities and a value addition to farmer’s variety is not explained.

This policy can have positive impact through the development of agro-processing industry targeting international market as an option to enhance agro-biodiversity focusing on products like organic coffee and enset.

5.5.2. Legal Framework

The constitution recognizes the right to ownership of private property (Art 40.1) indicating as; engage freely in any economic activity and to pursue a livelihood of his choice (Art 41.1); choose his means of livelihood, occupation or profession (Art 41.2); and the rights of Ethiopian farmers and pastoralists to receive fair price for their products that could lead to improvement of their livelihood and to enable them obtain fair share of the national wealth commensurate with their contribution (Art 41.8)). This is found to be good opportunity to encourage farmers to produce quality products and conserve its varieties.

i) Trade registration and licensing law

The trade law (Trade Registration and Business Licensing Proclamation No. 67/1997 and amended by proc. no.686/2010 as commercial registration and business licensing opened-up
trade and industry to any person who desire to engage in such commercial activities upon obtaining a business license (Art 32(1)).

As a requirement for commercial activities to be undertaken should comply with environmental protection rules and any business activity does not violate environmental protection laws as pre-condition for the granting of business license (Proc. No 67/1997, art 22(2)). Moreover, it states that if a business activity to which license has been granted is ascertained to have violated the laws, the license may be suspended until such shortcoming is rectified, and that the license may be revoked. This has significant contribution for controlling business activities that may affect agro-biodiversity.

ii) Investment law

According to the investment policy (Proc. No.280/2002 which, amended by proc. No.375/2003(Art 4)) the government introduced investment law to create conducive environment for investors to invest in the country. This investment law seeks to attract capital, technology, and know-how so as to create wide employment opportunity (Art. 4(1-8). The investment law allows foreign nationals to engage in commercial activities that are open to foreign investment (not reserved for nationals art 12(3)) with a minimum capital out lay of USD 200,000 upon obtaining an investment license(Art.11(1)). As an incentive to attract investors, the investment law provides income tax and custom duty exemption for certain category investment activities. Investors who are engaged in manufacturing and agro-industry and production of agricultural products and exports at least 50% of product, or supplies at 75% of it to exporter as input are entitled to income tax exemption for 5 years or up to 7 years upon decision by the Investment Board in certain special circumstances, as of date of commencement of production or service (Art. 23 (4)).

According to this proclamation, investment bodies shall, after issuing the investment permit, notify the concerned environmental organs so that EIA conducted with the necessary follow up. This will have positive impact on the protection and conservation of agro-biodiversity with its ecosystems through the mechanisms set in EIA.
5.5.3. Institutional frameworks

i) Trade, Industry, and Investment

The Ministry of Trade and Industry (currently independent ministers) is the lead sectoral institution responsible for promoting the expansion of trade, industry, and investment in the country. Ethiopia introduced a free market economic policy in 1991. The policy provides for the liberalization of prices and markets, removal of subsidies, reduction of tariffs, and attaining currency stability. The sector has the specific mandate to, *inter alia*, create conducive conditions for the promotion and development of the country's export trade; maintain efficient marketing systems and fair trade practices to promote and develop domestic trade; issue business license with respect to commercial activities under federal jurisdiction and ensure that they are operated in accordance with the law; create conducive conditions for acceleration of industrial development; provide support to industries considered to be of strategic importance; and create enabling environment for domestic and foreign investment (Proc. No 471/2005, art 15).

There are some commercial activities, because of their technicality, that are issued licenses by other relevant sectoral institutions (Proc. No. 67/1997, art. 20). Bureaus of Trade, Industry, and Transport are responsible for promoting the expansion of trade and industry at regional levels. These sectors can help to initiate farm gate prices of agro-biodiversity products/farmers varieties to produce more through advertisement and incentive mechanisms such as market value addition, awareness raising to produce quality product and market networking.

ii) Investment agency

The Ethiopian Investment Agency is responsible for promoting, coordinating, and facilitating for foreign investors in the country. In this respect, it has the power to approve and issue investment permit to foreign investors, trade registration of foreign investors, issues operating licenses to approved foreign investment, and facilitate acquisition of land by foreign investors.

The investment by Ethiopian nationals is licensed by regional investment bureaus and they are responsible to facilitate and promote investment activities in the regions. With regard to EIA requirements both the federal and regional bodies are responsible to request investors to
provide their EIA study to ensure the feasibility with regard to environmental protection. The positive aspect with these investment bodies is that they can contribute in the safeguarding of agro-biodiversity from harms caused by investments. Hence, it will have significant contribution in the conservation and promotion of agro-biodiversity and farmers’ varieties through the processes of EIA and investment promotion.

iii) Ethiopian commodity exchange authority

Ethiopian Commodity Exchange Authority has been established by proc. No 551/2007 as an autonomous public institution to establish an efficient agricultural commodities marketing system and protects the rights and benefits of sellers, buyers, intermediaries and the general public. Specifically, it has the power to, *inter alia*, formulate directives concerning the regulation of commodity exchange, clearing institutions and exchange actors, supervise and verify observance of same; issue directives on the specification, sale and purchase principles of any exchange traded contracts; regulate the clearing and settlement of exchange trade contracts.

There are different sectoral institutions with commodity exchange, at federal and regional levels, that have impact on the conservation and sustainable use biodiversity. The establishment laws of such institutions do not require them integrate considerations of biodiversity conservation in the respective sectors. However, they can play significant role in mainstreaming agro-biodiversity and farmers’ varieties into this commodity exchange system.
6. POLICY AND INSTITUTIONAL GAP ANALYSIS

6.1. Policy Gap Analysis

i) Less attention for the conservation of agro-biodiversity and farmers’ varieties

The findings from the review of policies of biodiversity, environment, trade, industry, investment, agriculture, and forest revealed that the issues of conservation of agro-biodiversity has not been addressed well in a way to ensure mainstreaming in the country’s agricultural production systems. The finding indicated that only the environmental policy promotes well the conservation and sustainable utilization of biodiversity and agro-biodiversity. Thus, the environmental policy recognizes the conservation of agro-biodiversity and farmers’ varieties so as to utilize in a sustainable manner.

Even if biodiversity policy has high relevance to wise use of biodiversity and agro-biodiversity, it is too general to identify options and recommended actions for the conservation and sustainable use of agro-biodiversity in national plans. This indicates that there has been lack of attention for the conservation of agro-biodiversity resources.

Requirement of EIA (Art. 5(3)/4) before starting of implementing any project and the existence of biosafety law (Art. 5) has positive implications to agro-biodiversity conservation and protecting from harmful activities. But, it lacks clarity with regard to agro-biodiversity and how biodiversity loss could be valued and compensated when proponents affect it. Moreover, the use of exotic tree species in forest proclamation (Art. 5(3)) threatened indigenous tree species that are conducive for the conservation of forest coffee. Another finding is, encouragements in the use of high yielding varieties, chemical fertilizers, and agro-chemicals to respond food security in agricultural policy have not addressed well the values of agro-biodiversity conservation and responsibility to protect from genetic erosion with competition coming from high yield varieties.

Again, the attention given to agro-biodiversity and farmers’ varieties in the Ethiopian commodity exchange system has been found focusing only on coffee without giving special emphasis to organic/forest once. Cited as the high value of agro-biodiversity for resilience of climate fluctuation, its organic products, and the social and economic significance, rethinking of conservation of agro-biodiversity is to be critical.
ii) Less attention to integrate agro-biodiversity with other relevant sectors

Different policy directions, reports, plans and strategies of agriculture, trade, environment, forestry and others showed that there is lack of integration into relevant sectors for conservation and sustainable utilization of biodiversity and agro-biodiversity. For instance, targeting agro-processing industry and exportable agricultural products (such as coffee, tea, spices, and flowers) in agriculture sector is good opportunity to enhance agro-biodiversity especially producing farmers' variety such as forest organic coffee and enset. But these strategies fail to state how quality agricultural product would be produced by enhancing agro-biodiversity and farmers' varieties in the industry sector.

iii) Lack of agricultural production packages for farmers' variety

The agricultural technology package gave priority to increase crop productivity using inputs of high yielding varieties, chemical fertilizers and agrochemicals to attain food security in short run. Due to this fact, the attention given to production packages for farmers' varieties and agro-biodiversity has not been satisfactory. It has not been found integrated in research and agricultural extension package with regard to farmers' varieties and agro-biodiversity resources. Moreover, the country has not much benefited from selling its endemic species like teff germplasm. The significance of agro-biodiversity for sustainable agriculture and food security has not yet addressed well in agricultural policy.

iv) Absence of incentives and market promotion activity

Encouraging farmers to produce farmers' varieties/local land race through market promotion activity, use of eco-friendly agricultural inputs such as organic fertilizers and practical training how to conserve and ensure productivity is required. Moreover, in trade and industry sectors the role of agro-biodiversity for agro-processing have not been explained in their plans, strategies, and policies.

While the agricultural extension services and strategies are very useful in the conservation of agro-biodiversity resources it has been found that farmers' varieties do not included in such activities and strategies. Lack of such support lead farmers to focus on high yielding crops to gain the extension support in the expense of their favored varieties and accumulated knowledge. This can have negative impact on the availability of diversity in crop varieties that
fit the range of agro-ecosystems and the need of small-scale traditional farming and the majority of farmers.

v) Food security initiative pressure

The principle of agricultural policy such that increasing agricultural productivity using high agricultural inputs with high yield varieties led accelerated genetic erosion and affect production and sustainability of farmers’ variety/land races. For instance, a case study by Bayush and Berg (2007) in central Shoa area indicate that the loss of land races (farmers’ varieties) diversity was estimated to be 77%. They justified expansion of improved variety of bread wheat, lack of mechanisms to resupply seeds (farmer’ varieties), changes in land use, cropping pattern, and lack of policy support as the main reason for durum wheat genetic erosion. Moreover, the 2007 forestry law promotes use of exotic tree species (Art. 5(3)) to maximize income and ensure food security. This opens atmosphere doorway for the continued accelerated erosion of the biological resources particularly in forest coffee of yayu without considering long term impacts on the local ecosystem and agro-biodiversity.

However, agro- biodiversity by itself is a grant for food security not only to Ethiopia but globally and resilience of climate fluctuation. For instance, production of Enset, coffee, durum wheat, teff and other farmers’ varieties have significant role in maximizing income and ensure food self-sufficiency.

vi) Environmental policy and investment policy contradiction

The requirement of EIA (Proc.No.299/2002, art 5(3/4)) and the existence of Biosafety (Art.5) law have positive implication for the conservation of agro biodiversity resources of the country. The investment policy is also has a positive contribution that aimed to promote investment on agricultural development if it remains consistent with the national biodiversity and forestry policies and strategies, as well as with sectoral environmental policies. Therefore, it is necessary to enforce EIA requirement for agricultural investment activities in areas of key agro-biodiversity hotspots in general and target crop sites in particular.
6.2. Institutional Gap Analysis

Ethiopia has comprehensive policies and strategies (although with some gaps as described above) but many of these are not implemented efficiently and effectively in line with the conservation of agro-biodiversity resources. Most of this is attributed to vague mandate clarity, weak coordination, unavailability of organizational structural, infrastructure development, and weak institutional capacity. Perhaps, the greatest institutional barrier to agro-biodiversity conservation is the fact that there is no defined agro-biodiversity management working structure with key stakeholders that stretched to the grass root/kebele level.

i) Mandate clarity

The mandates of the Ethiopian Biodiversity Institute at federal level and the mandates of Bureau of Agriculture at regional level towards biodiversity conservation are not clearly delineated. The establishment act of the biodiversity institute Proc.No.120/1998 amended (Proc. No 382/ 2004) and Regulation No. 291/2013 does not clearly delineate the mandates of EBI and mandates of BoA as to the responsibility of conservation and sustainable utilization of bio-diversity resources. More specifically, the question, which sector is responsible for conservation and sustainable utilization of agro-biodiversity at region and district level, has not been answered. This hinders the conservation of biodiversity resources in general and agro-biodiversity in particular.

ii) Coordination/Integration

Weak coordination and formal communication has been observed among key stakeholders of researchers, breeders, gene banks, and farmers in different institutions such as agriculture, trade, forestry, and environment, at federal and regional levels. It indicates that there is no functional coordination mechanism in such a way, through the formation of committee or board. The establishment act of the EBI (Proc. No 382/ 2004, amended) does not provide for the linkage between IBC (a federal institution) and other relevant regional institutions. The establishment laws of other institutions (both at federal and regional levels) do not provide for the system of linkage or coordination between EBI and among themselves. Due to this fact, there is no two-way information exchange mechanism between service provider and receivers.
iii) Infrastructure development

Infrastructure development has positive contributions towards the development of agro-biodiversity resources. In one hand expansion and maintenance of infrastructure in rural areas where high level of agro-biodiversity is available can create opportunity to agro-biodiversity production and access to market so that farmers’ varieties will have higher prices. In the upcoming plan period, infrastructure development will be further intensified with due focus on the quality of services and urban-rural market integration.

iv) Weak institutional capacity

Ethiopia has a comprehensive and consistent set of policies and strategies for different sectors. Nevertheless, the institutional capacity to implement these is found to be generally limited. To address this important constraint, sectors have been implementing the civil service reform program as an effort to improve their operational and organizational systems as well as to change their workforce attitude. Improvement in institutional capacity with key stakeholders can have positive contribution with regard to the conservation of agro-biodiversity resources.
Humans have been engaged in farming for about 7,000 years, mainly for the production and consumption of food that has been connected to cultural, social, and marketing systems. Yet, in previous generations, the tendency to shift the agricultural systems to industrial agriculture, with the intention of mass production, to meet the ever-growing demand for food in line with the growing population in every part of the world. But, the industrial agriculture only focus on high production without recognizing the harmful side-effects caused by chemicals, fuels, and different kinds of inputs that damage the environment (biodiversity, water, soil, and air). In addition, the industrial agriculture system has been using only hybrid crops only look production for market tend to be mono crops, impose damage to land races and ignored sustainable agriculture.

Concerned of the biodiversity, environment, and human health problems associated with industrial agriculture, researchers and scientists in the related fields are advocating, based on research evidences, the value of organic and sustainable agriculture, the system manifested in the stability of the farming, and production system friendly with the environment. As Ethiopia is a center of agro-biodiversity that harbors important gene pools of cultivated crops and wild crop relatives and agrarian, the country has been facing challenges with respect to the loss of farmers’ varieties and related problems.

The result of this study shows that, the conservation of agro-biodiversity/farmers’ varieties has not been recognized well and supported by the available policies and institutional frameworks of key stakeholders including research institutions and universities found in the country. Despite the huge potential resource base of Ethiopia including varieties of land races/farmers’ varieties and diverse agro-ecological zones, conservation of agro-biodiversity has not been mainstreamed into the agricultural production and research systems of the country. In addition, with the available policies and legal frameworks, key stakeholders have not yet used their policies and law instruments, as guidance to conservation of agro-biodiversity and farmers’ varieties in different sectors.

Furthermore, this study indicates that due attention has not been given to the conservation of agro-biodiversity by the relevant and responsible sectors. Insufficient attention to sustainable
agriculture with due focus to the conservation of agro-biodiversity leading to loss of farmers' varieties, damage soil resources and the ecosystem, which is reflected with the declining in the availability of farmers' crops that the farming community rely on and the needs and satisfaction of the consumers. Hence, the significance of agro-biodiversity for sustainable agriculture and food security has not been recognized well in Ethiopia.

Unless the current condition reversed and due attention will be given to the conservation of agro-biodiversity, with recognition to its significance and value of farmers knowledge, the country would be affected due to the consequence of the loss of its biodiversity resources with regard to farmers' varieties and crop wild relatives.

The findings of the review revealed that all existing polices and institutional frameworks of key stakeholders, including biodiversity need to integrate agro-biodiversity and climate change impacts on agriculture. There is a need to revisit and amend the overlaps and gaps among different institutions those have stake with agricultural development and environmental conservation. To this end, the following are therefore recommended:

a. Establish incentive mechanisms to farmers involved in the conservation of agro-biodiversity through long term farm credit service, promoting participatory on-farm research and promote value addition to farmers' varieties. Strengthen agricultural extension packages for farmer's variety through on-farm research and strong extension services for crop yield and quality improvement and advocate nutritional value of framers' variety.

b. Build-up processes of community by-laws that will be supplementary to the existing policies and institutional frameworks. Develop understanding of farmers' rights not simply with respect to breeders' rights, but on their own terms. In other words, the aim should not be to merely create exemptions for farmers on breeders' rights but to develop a legal framework that supports informal seed systems and diversified cropping patterns so as to promote household food security.

c. Implement comprehensive national policies and strategies especially for enset, durum wheat, and teff, and update those for wild coffee Arabica on top of their wild relatives. In other words, formulate appropriate rules and regulations (laws) and enhance the capacity to implement and enforce the rules concerning these endemic crops.

d. Set up priority and attention for teff and other endemic crop germplasm collection, characterization and utilization. This is peculiar responsibility for EIAR and EBI.
e. Incorporate plans and strategies of agro-biodiversity and its wild relatives on the existing plans and strategies of agriculture, trade, investment, forestry development, environment, and industry sectors. To make it effective create awareness at all levels to enhance the value of agro biodiversity and wild relatives.

f. Clarify the mandates of biodiversity management institutions to direct biodiversity activities at regional, zonal and district level. This will also help to clarify and delineate the mandates of federal (EBI) and regional institutions to facilitate the coordination among them.

g. Establish integrative agro-biodiversity science that links biological, ecological, and social disciplines to provide the scientific, institutional, and policy basis for the sustainable use and conservation of agro-biodiversity;

h. Elaborate food security issue and agro-biodiversity conservation are complementary issues particularly in the face of climate change;

i. Establish more ex-situ and in-situ conservation sites and boost the sustainable use of agro-biodiversity;

j. Strengthening institutional capacity through improved coordination mechanism and building capacity of the staff through training and experience sharing across local, national, regional, and international levels to facilitate policy implementation;

k. Revisit institutional mandates of various sectors working on biodiversity conservation and sustainable use to avoid conflicts because of overlaps.
8. REFERENCES


9. ANNEX: Reports of case studies on the institutional and regulatory frameworks at four project sites

Annex 1. Institutional and Regulatory Frameworks at Target/ project Sites

The development policy pursued in regions is adopted from the government at national levels. It is in line with the bio-physical and socio-economic conditions in the respective jurisdiction. Accordingly, the development plans at local (zone, districts, and kebeles) levels are framed based on the rural development policies and strategies, taking into account the agro-ecology and production potential in the respective district. Following is the overview of the development plans at local levels (zone/district) at the target/project sites so as to elaborate the situation and impact of sectoral policies, plans and regulatory frameworks at local levels impacting biodiversity and agro-biodiversity in general.

i) Angacha District -Enset Target Site

Angacha woreda is one of the woreda in Kembata Tembaro zone in the Southern Nation and Nationalities and Peoples' Regional State (SNNPRS). The rural people engaged in mixed farming agricultural production system. Crops such as maize, sorghum, wheat, teff, barely, check pea, enset and coffee largely produced in the area.

The agriculture sector intended to ensure the realization of accelerated agricultural development and production of agricultural products to be competitive on the market for economic and social development. It has the responsibility to facilitate conditions for timely provision of inputs to farmers, transfer technologies generated by research institutions; and facilitate implementation of programs. Since the zone is food self-insufficient, the plan details the agriculture production and productivity targets to be achieved. The productivity targets and intervention plan include to increase the current productivity of crops, using high yielding inputs, which is 18 quintals per ha to 42, according to the report from the woreda office of agriculture, increase the current productivity crops, which is 17 quintals per ha to 33 through enhancing the use of new improved plant varieties; increase the number of farmers using organic fertilizer to 65%; and reduce post-harvest crop damage by pest by 30% through enhancing use of pesticide.
The agricultural development plan aimed to increase crop production and productivity in the upcoming plan period through extensive use of high yielding variety, chemical fertilizers, and agrochemicals. Even though the five years development plan of the zone identifies degradation of biodiversity as one issue of concern to the zone, it does not propose any action plan to address it except the preparation of natural resources data base and land use planning which may be said to have some indirect relevance.

Though Enset is major staple food crop in the zone, the attention given to manage it is minimal. There are no technologies and research plans intended to enset production enhancement. Since the zone is food insecure, improved production and use of enset could have great contribution to alleviate food insecurity. This might be due to agricultural development policy that focuses on the production of marketable products such as coffee and spices. There is no extension package for enset in their plan. District Offices gave priority for cash crops rather than staple food crop like enset. Therefore, rethinking the values of enset in the zone is crucial to achieve food security and agro-biodiversity complementary goals of food security, agro-biodiversity conservation, and climate change adaptation.

ii) Minjar-shenkora district-tef target site

Minjar-Shenkora is one of the districts in the North Shoa Zone of Amhara Regional State. The development plan of the district is formulated in line with the national socio-economic policies, taking into account the socio-economic situations that are aimed to ensure agro-ecology centered and market oriented accelerated agricultural development through provision of extension service and yield enhancing inputs and development of infrastructure. The agricultural development activities and targets planned for the plan period based on the frame work of Amhara region Agriculture Bureau strategic plan. They intended to perform watershed based tasks in all kebeles. Beyond resource conservation and management they assist farmers to enable cooperatives to be lead market actors, and facilitate provision of fertilizer, improved seed and chemicals.

The agricultural development plan focuses on enhancing the use of chemical fertilizer and high yielding varieties. The use of chemical fertilizer in the district doubled in 2003/4 from (30.9 ton) to (60.3) in 2007/08 within four years. It is important to note that the amount of high yielding varieties distributed through the extension system does not indicate the actual rate of use due to the
tradition of seed re-use and exchange among farmers in Ethiopia. Hence, the actual scope of high yielding varieties utilization may be far greater than what estimated above. Therefore, the increasing rate of chemical fertilizer use and high yielding varieties coupled with the absence alternative soil fertility management practice may have harmful impact on agro-biodiversity. Teff is mainly produced in this district. As Ethiopia is the only source of genetic material for the improvement of teff, growing both farmers' varieties and improved varieties could have vital role. Therefore, conserving the diversity of teff and addressing food security is a priority in Minjar-shenkora district.

iii) Gimbichu district- durum wheat target site

Gimbichu is one of the districts in the East Shoa Zone of the Oromiya Regional State. Crop production is the major agricultural production development activity in the district. The crop production development plan shows the increase in the total area of land under cultivation. The plan of the district indicates that the total land area under lentil cultivation increased by 300% within three years. This drastic increase of the total land area under lentil cultivation is alleged to be due to the sharp increase in the price of lentil on the market. Such development trend affects the conservation and sustainable use of other crops such as durum wheat, the major crop type in the district. The trend of the agricultural development plan in the district showed that it poses high threat to the conservation and sustainable use of agro-biodiversity. The scope of increased use of improved varieties and chemical fertilizer and the expansion of agriculture into the limited land under other uses appears to pose high risk of agro-biodiversity degradation. This calls for action to address this biodiversity threat. Such includes introducing measures that induce the increased use of local varieties alongside improved ones; establishment of community gene banks, introducing incentive measure, improved compost making, develop technologies and management practices that enhance productivity of landraces, demonstration of high yielding local varieties and promotion of market for local varieties.

iv) Yayu district-forest coffee target site

Yayu is one of the districts in the Illubabor Zone of the Oromiya Regional State. Coffee production is the major agricultural activity in the district and a priority area to the government’s development focus. The fall of coffee price in the past years and the drastic rise in price of food crops (e.g. maize) has led farmers to clear coffee for crop production. But recently, the increase in coffee price and government's push to promote expansion of coffee cultivation
is inducing farmers to clear forest for coffee cultivation rather than reversing the shift from coffee to crop. Here price is sole factor for type and quantity of crop production.

According to the report of Oromiya Forest and wildlife Enterprise, Ilubabor Zone Office, a 66,000 ha of forest in Yayu district was designated as “Yayu State Forest” which is now under the management of the Oromiya Forest and wild life Enterprise on concession. Of this 20,000 ha of natural forest Geba-Dogi has been demarcated (11,000 ha and 9,000 ha as core and buffer area, respectively) as coffee conservation area. The conservation of forest coffee and other biodiversity in the area is dependent on the conservation and sustainable use of Yayu state forest and the surrounding forest in the ownership of the community. The district’s report indicates that the forest reduced from 66,000 ha to 56,460 ha mainly due to deforestation for agriculture and settlement.

Hence, deforestation is the major threat to diversity of forest coffee in the district. Accordingly, deforestation control through strengthening forest management committees at kebele level, raising public awareness on the conservation and utilization of forest, and takes action on illegal forest users is required. The 2007 forestry legislation (Proc.No 542/2007) is highly applicable to the conservation and sustainable use of biodiversity in general and forest coffee diversity in particular in Yayu forest. Due constraints, the yayu coffee faced low productivity, lower price, high canopy density of shade trees, lack of brand for yayu coffee, the stake holders are not in close relation that enable them to conserve it. Therefore, awareness, coordination, market promotion, extension packages and training to coffee farmers are required to maintain quantity and quality of organic coffee of this forest.