*'Innovations in Technology, Institutional and Extension Approaches towards Sustainable Agriculture and enhanced Food and Nutrition Security in Africa'*


# ETHIOPIA

## Country Report

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## Country context

### Background

Agriculture is the major source of livelihood in Ethiopia. However, food and nutrition security (FNS) remains a serious challenge. Smallholder subsistence farming, which is predominantly dependent on rainfall, is the major form of agricultural production. Although efforts have been made to increase productivity of smallholder farms through supply of inputs such as fertilizers, pesticide, and improved seeds, there has been low level of systematized support with extension and advisory services. This problem has exacerbated the degree to which agriculture suffers from vagaries of nature and other calamities. This includes incessant droughts, land degradation, emerging pests and diseases, socioeconomic factors, and others. To address the low productivity of the agriculture sector, the government of Ethiopia designed Agricultural Growth Program. The envisaged growth is to be achieved through increasing crop and livestock production and productivity. What is more, three major activities are vital in these endeavours: *scaling up of best practices, improving the utilization of water resources through irrigation and natural resource conservation and development, and focusing on high value marketable agricultural enterprises.*

### InnovAfrica project

InnovAfrica targets at improving FNS in Ethiopia by integrating sustainable agriculture intensification systems (SAI), innovative institutional approaches (IIAs) with novel extension and advisory services (EASs), and by enhancing capacity building and knowledge sharing in smallholder farming through a strong EU-Africa Research and Innovation Partnership. InnovAfrica project is hoped to contribute to enhanced dissemination of SAIs, EASs, and IIAs and promote linkages and synergies among different institutions and stakeholders for increasing food production, thereby improving FNS. The project has six work packages to be implemented in two project sites in Ethiopia.

### Project sites description

The two project sites are Meta and Kombolcha districts in East Hararghe Zone of Oromia National Regional State. The main activities that will be carried out in the project sites include:

***Sustainable Agriculture Intensifications systems (SAIs)***

- Maize- or sorghum-legume intercropping and Brachiaria forage livestock system will be tested in the two project sites.

***Extension and Advisory Services (EASs)***

- Farmers' groups, extension experts, and researchers will play key roles in the dissemination of knowledge, technologies, and innovations.

***Innovative Institutional Approaches (IIAs)***

- A Multi-Actor Platform (MAP) consisting of five members was established to provide institutional supports to the project and enhance sustainable dissemination of innovations
- Integrated seed delivery system and multi-actor platform approach will be implemented under IIAs. In addition, integrated farm plan will be tested.
- Existing food value chains will also be analyzed.
- Promoted and implemented agricultural policies and institutional mechanisms will be examined.

***Cross cutting issues***

- Existing challenges and opportunities in mainstreaming gender and youth are assessed. Furthermore, gender-related activities are identified, planned and implemented.
- Farmers and other stakeholders are fully engaged in the process of analysis, planning, implementation, monitoring and evaluation, and knowledge sharing.

### Project outcomes and impacts expected

- Farmers, development agents, women farmers' groups, and agricultural experts' knowledge will be increased through on-spot and off-spot training as well as experience sharing through field days, demonstrations, and participatory evaluations of project activities.

# 1 Introduction

Agriculture is the basis of the Ethiopian economy, accounting for over 40 per cent of the Gross Domestic Product (GDP), 90 per cent of the total export revenue, and employing more than 85 per cent of the country's labour force (Abate, 2006). Smallholder farmers generate about 90 percent of the country's agricultural output. Production of major crops such as sorghum, teff, wheat, maize, pulses, and root and tuber crops by smallholder farmers is the core of Ethiopia's agriculture and food economy, accounting for about three-quarters of the total area cultivated and 29 percent of the agricultural GDP (IFPRI, 2012). The livestock sub-sector also plays an important role in Ethiopian economy, which is an important source of food, traction, and hides and skins for foreign earnings (CSA, 2012). However, the country's agriculture is characterized by low productivity, resulting in widespread food and nutrition insecurity. The average grain yield for various crops is only about 1 ton/ha (Byerlee *et al*., 2007). The main biophysical and socioeconomic factors contributing to the low productivity of crops are presented in Table 1.1

Table 1.1: Biophysical and socioeconomic constraints to agricultural productivity and sources

| Constraints | References |
|---|---|
| Depletion of soil fertility caused by<br>• Intensive cropping<br>• Inadequate soil conservation practices<br>• Shortening of fallow period<br>• Removal of plant residues from crop fields | Lal (2006) |
| Inherently low yielding crop cultivars | Byerlee *et al* (2007) |
| Low adoption rates of improved crop varieties | Belay (2002) |
| Low use of agricultural inputs | Birara et al (2015) |
| Poor agronomic practices | Deressa *et al* (2013) |
| Pests and diseases | Birara et al (2015) |
| Inefficient implementation of technologies and knowledge | Spielman *et al*. (2012); Tefera (2013) |
| Gender imbalance | Ministry of Women's Affair (2006) |

Similarly, meat production per head of livestock in Ethiopia is low even by the standards of other livestock-producing African countries. For instance, it is just 8.5 kg per head of cattle per year, significantly lower than that of Kenya (21 kg/head) and Senegal (16 kg/head) (Asfaw and Jabbar, 2008). Livestock productivity is constrained mainly by feed shortage especially during the dry season, and poor-quality feed (Alemayehu, 2002). Extreme weather conditions such as droughts and floods due to climatic change exacerbate the problems and invariably result in hugely diminished crop and forage yields and quality. Thus, food and nutrition security (FNS) has remained a serious challenge in the country. This is so despite the considerable efforts made in agricultural research and extension in the past decades.

Thus, smallholder farmers need to be supported with technology and innovations to attain the required level of food and nutrition security. In this connection, integrated innovative approaches are needed to operationalize existing knowledge and technologies for higher productivity and income. However, adoption of improved agricultural production technologies is very weak in Ethiopia due to the fact that the conventional research approach hardly involves farmers and other stakeholders in farm problem diagnosis to evaluation of research activities. Enhancing adoptions of technological innovations and best practices, hence, requires stakeholders' involvement and capacity building.

The InnovAfrica project that is implemented in Ethiopia and other five African countries is believed to address some of the challenges mentioned above. The main objective of InnovAfrica

is to improve FNS i) by integrating sustainable agriculture intensification systems (SAIs), innovative institutional approaches (IIAs) with novel extension and advisory services (EASs), and ii) by enhancing capacity building and knowledge sharing in smallholder farming system in Sub-Saharan Africa (SSA) through a strong EU-Africa Research and Innovation Partnership.

The InnovAfrica project main activities include:

- Interdisciplinary review and mapping of sustainable agriculture intensifications (SAIs), Innovative Institutional Approaches (IIAs), and Extension and Advisory Services (EASs);
- Setting up of innovative Multi-Actor Platforms,
- Farmer-led on-farm experimentation of innovative SAI, IIAs, & EASs,
- Agricultural food value chains (VCs),
- Novel institutional and policy frameworks; and
- Exploiting and disseminating project results through selected EASs.

In Ethiopia, the InnovAfrica project is to be implemented by Haramaya University. The major components of the project to be tested, integrated, and disseminated include maize or sorghum-legume intercropping system and Brachiaria forage livestock system under SAIs; multi-actor platforms and integrated seed delivery system under IIAs, and integrated farm plan under EASs.

To enhance dissemination of innovations and knowledge sharing, farmers and other stakeholders will be involved in the research process (problem identification, planning, implementing, monitoring and evaluation of the project activities). Stakeholders' platforms will be established to provide institutional supports to the project and enhance sustainable dissemination of innovations. Farmers' groups, extension experts, and researchers will play key roles in the dissemination of knowledge, technologies, and innovations. Capacity of farmers, development agents, women farmers' groups, and agricultural experts will be enhanced through on-spot and off-spot training as well as experience sharing through field days, demonstrations, and participatory evaluations of project activities.

Progress of the project and ascertained project achievements will be conveyed to regional and national decision-making bodies using various communication tools and networking to institutionalize validated innovations. Different forums including workshops and field days will be organized to monitor and evaluate impacts of the project with respect to socio-economic, food and nutrition security, and ecological aspects. Moreover, to enhance awareness of end-users and other key stakeholders and promote uptake of innovations, different dissemination strategies will be employed.

This report gives a general overview on the two project sites, namely, Kombolcha and Meta districts about their geographical settings, production systems, smallholder challenges, and opportunities; promising SAIs, IIAs, and EASs to be implemented in the project sites; major value chain actors to be addressed; review of the current policies and institutional approaches; and mainstreaming gender and youth in project interventions.

# 2 Description of Project sites

## 2.1 Kombolcha district

*i) Geographical settings:* Kombolcha is one of the districts in East Hararghe zone of Oromia region. It is bordered on the south by the Harari region, on the southwest by Haramaya district, on the northwest by Dire Dawa Administrative Council, on the north by the Ethiopian-Somali region, and on the east by Jarso district. Melka Rafu is the administrative center of the district.

It is situated between 09°22' N-09°35‘N and 42°06' E-42°13' E with altitude that ranges from 1200 to 2460 meters above sea level (Figure 2.1).

The topography of Kombolcha constitutes a very complex terrain that includes gently sloping dissected plains and plateaus to moderately steep and undulating medium to high gradient hills. A significant northern part of the district is hilly with steep slopes, with Wara Mucha, Babo, and Lalu amongst the highest peaks in the district. These geographical features limit accessibility to some of the *kebeles*[1] in the district. Also, river courses are present in certain valley floors.

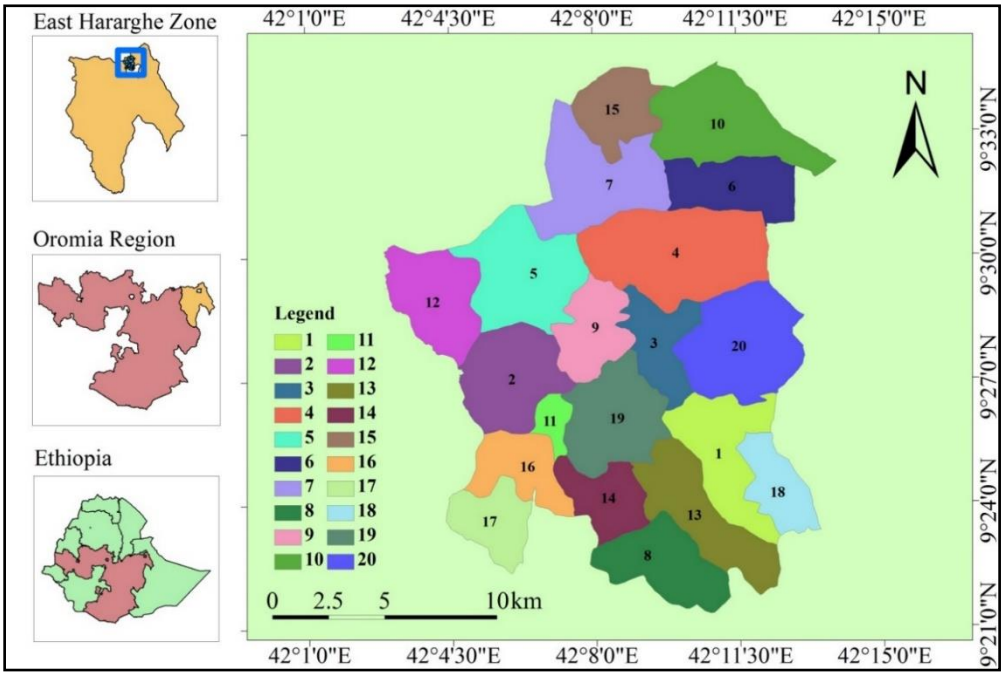

Figure 2.1 Map of Kombolcha district and its administrative *kebeles*.

The approximate total area of the district is 30,452 ha, of which the largest portion (i.e. 78 percent) is covered by non-arable land that is comprised of built-up, degraded, or otherwise unusable terrain), 16.8% by arable land, 1.7 percent by pasture land and 3.9 percent by forest land. The 2007 national census reported a total population of 140,080 in the district, of whom 70,967 are men and 69,113 are women. According to the census, about 91 percent of the total population lives in the rural areas of the district. The population density is as high as 235 persons per km$^2$. The district is divided into 20 *kebeles* (CSA, 2007). The area coverage among these *kebeles* varies from 308 ha to 2938 ha, with average area of 1523 ha. From the twenty *kebeles*, the proposed farmer-led field experimentations will be implemented in Egu and Bilisuma *kebeles*. These *kebeles* are selected based on their production potential, accessibility to other neighboring farmers, suitability of the agro-ecologies to the selected crops/cropping system, willingness and experience of farmers, and commitment of development agents in the selected areas.

The Kombolcha district is characterized by lowland and midland agro-ecological climatic conditions. It receives a mean annual rainfall of 600-900 mm, which is bimodal but erratic in distribution. The small rainy season starts in February/March and extends to mid-May, while

[1] *Kebele* is the smallest administrative unit in Ethiopia

the main rainy season stretches between July and August. The mean annual minimum and maximum temperatures are about 14 and 24 °C, respectively.

Owing to the generally high population pressure and the consequent land scarcity, almost all slopes are cultivated except the very steep hills. The steep hills are being rehabilitated following the natural resources management policy of the country that has been adopted recently. A combination of physical soil and water conservation structures, such as stone/soil bunds and terraces, and biological measures, such as planting of trees, are being practised. Because of these interventions and their protection from cultivation, the vegetation cover has begun to regenerate. At some places, the sides of steep slopes are covered by the narcotic stimulant crop khat (*Catha edulis* Forsk) often intercropped with sorghum, maize, sweet potato, and other crops. The steep slopes are also used as settlement areas.

*ii) Vegetation:* The commonly observed vegetation cover in the district is shrub and bushes composed of different species. Some of the steep slopes are covered by replanted and remnant tree species such as *Juniperus procera*, *Olea oleaster*, *Podocarpus totara, Ficus sur,* and *Accacia abyssinica*. Around homesteads are found eucalyptus trees. Some agro-forestry tree species such as *Acacia abyssinica* and *Croton macrostachyus* are found on individual farmers' fields.

*iii) Water resources:* Kombolcha district has the Erer and Fefra rivers in addition to dependable groundwater resource in the valleys. Furthermore, many perennial springs originating from under the hills are very common. Groundwater is found at a shallow depth that ranges from seven to 20 meters from the soil surface. Farmers have the excellent traditional practice of opening a hand-dug well for taping groundwater resource. As a result, small-scale irrigation is practised intensively on the gentle slopes and valley bottoms of the district during off-seasons. Irrigation is also practised on the steep slopes by pumping water against the sloping gradient.

Some of the flat lands such as that in Egu *Kebele*, and the valleys are very much affected by waterlogging during the rainy season and by frost during the coldest months (October to January). Due to these factors, the yield obtained from these areas from rain-fed agriculture is often very low and is not enough to feed households. Particularly, plains occupied by Vertisols require some surface drainage channels and cut off drains to be constructed along the slopes.

The common irrigation practice is traditional that combines flood, furrow, and/or basin irrigation without proper irrigation scheduling. The steep slopes are the main sources of water that come as springs or recharged groundwater. Thus, the current national participatory and community-based watershed management program is a step in the right direction. Participatory and community-based watershed management is a strategy designed by the Ethiopian government to involve farming households in the efforts of conserving water, soil, forest, and other natural resource bases in their locality. It is mainly aimed at rehabilitating degraded watersheds. In this system, physical soil and water conservation mechanisms such as terraces, soil bunds, etc. are built and trees planted by members of the community involving men as well as women to prevent soil erosion and land degradation as well as enhance vegetation cover of the watershed. The improved physical structure established to prevent soil erosion and the vegetative cover will lead to decreased risks of water erosion as well as better soil fertility. In the long term, the regeneration of forests will be stimulated. The watershed is furthermore replenished by improving the water absorbing capacity of soils. Finally, the increased availability of water and vegetation will ensure sustainable and long- term improvements of the ecosystem for sustainable farming and improved livelihoods

*iv) Farming system:* The farming system is predominantly mixed cropping with livestock husbandry. The middle and lower slopes and the valley bottoms are the main agricultural lands. The lower slopes and valleys are also used for production of cereal and vegetable crops during the rainy season as well as the narcotic stimulant cash crop *khat*, during the off-seasons using irrigation. The major crops grown in the district include sorghum, maize, fenugreek, linseed, common bean, and wheat in some high elevation areas, and groundnut in the lowlands. The main cash/vegetable crops grown are tomato, beetroot, potato, cabbage, onion, carrot, pepper, lettuce, shallot, sweet potato, and spinach. Khat, coffee, fruits, and vegetables are the main cash crops. Khat is usually intercropped with sorghum, maize, sweet potato, and common bean.

Although the farming system is mixed crop-livestock production, the livestock component is not strong due to scarcity of animal feed in most of the *kebeles*. Grazing land is scarce and limited to small valley areas not used for agriculture, and on steep slopes. Farmers use cut-and-carry system. Farmers also cut and use maize and sorghum plant parts as feed particularly after thinning. They also use crop residues, weeds, and grasses growing on farm edges as feed. Introducing multipurpose improved forage species, namely, Brachiaria grass, may address shortage of feed in the area and enhance livestock production.

*v) Agricultural inputs (seeds, fertilizers and other chemicals):* The use of fertilizers is based on blanket recommendation of 100 kg urea and 100 kg DAP per ha regardless of soil type and crop needs. This is equivalent to 64 kg N and 20 kg P $ha^{-1}$. In addition, as a regular soil fertility maintenance program, every farmer is advised by development agents (DAs) to apply organic matter to the soil either as manure or in the form of compost. However, due to low availability of organic materials for preparation of compost, the positive impact of applied compost on soil fertility and health is minimal. Crop residues are mostly used as animal feed, fuel wood, and construction materials. Furthermore, the residues remaining in the field after harvest are burnt to avoid incidences of diseases and pests in the following cropping season. The combined use of all these practices would lead to low status of soil organic matter. The government of Ethiopia has embarked on developing soil fertility maps so that site- and crop-specific fertilizers recommendations can be made. This, in most cases, however is based merely on soil test results. However, calibration based on plant tissue analysis is still pending. Farmers have also limited access to inputs such as quality seeds of improved varieties, fertilizers, and pesticides. Consequently, it is vital to implement an integrated soil fertility management program to improve crop production and productivity, and ensure food and nutrition security of the farming community.

*vi) Markets and extension services:* The district has a good all-weather road network linking the *kebeles* with the district town, Harar city, and Dire Dawa Administration. The district has also better access to markets in the nearby neighboring countries such as Djibouti and Somalia. Nevertheless, farmers are not getting fair share/margins as they are exploited by middlemen. Especially when the commodities are perishable like vegetables, potatoes, and fruits, the farmers do not have the power to bargain and, hence, are often compelled to sell at very low prices that buyers or middlemen offer.

Almost all *kebeles* in the district have one farmers' training center (FTCs) at which practical skill training is given and demonstrations of showcasing technologies are done. Each *kebele* has on average three development agents (21 developments per 10,000 farmers, 1 DA: 476 farmers) serving as animal science, plant science, and natural resources experts. Furthermore, schools, micro-finances, cooperatives, farmers' groups, and health centers are available. Each

*kebele* has a leader and different committees dealing with different issues. Traditional institutions that are meant to facilitate social issues, such as wedding, funerals, etc. also commonly function in the community.

Ethiopia has an agriculture development-led industrialization (ADLI) economic strategy/policy. For this to materialize, the agriculture sector needs to develop at a faster rate. This is important to provide raw materials for the industry in addition to ensuring food and nutrition security. There is a strong policy support to promote sustainable intensification of smallholder agriculture. The country has adopted a national economic policy that focuses mainly on implementing the Agricultural Development Led Industrialization (ADLI) Strategy. ADLI aims at bringing an effective economic growth and building technology capability that enables the development of micro, small, medium, and large industries (FDRE, 2012). Strategic directions of Ethiopian Agriculture, as stipulated in the GTP document, are increasing the capacity and extensive use of labour, proper utilisation of agricultural land, taking account of different agricultural zones, linking specialization with diversification, integrating agricultural and rural development, strengthening the agricultural marketing systems, and effective implementation of the scaling up of best practices in the sector (MoFED, 2010).

Ethiopia has recently developed a Climate-Resilient Green Economy (CRGE) strategy for addressing both climate change adaptation and mitigation objectives and to protect the country from the adverse effects of climate change. The strategy is based on four pillars: improving crop and livestock production and productivity so as to attain household and national food security and enhance farmers' income while reducing emissions; protecting and re-establishing forests for their economic and ecosystem services, including carbon stocks; expanding electric power generation from renewable sources of energy five-fold over the five-year period for markets at home and in neighboring countries; and leapfrogging to modern and energy-efficient technologies in transport, industry, and buildings (FDRE, 2011).

## 2.2 Meta district

*i) Geographical settings:* Meta district is in East Hararghe zone of Oromia region. Meta is bordered in the southwest by Deder district, in the northwest by Goro Gutu district, in the north by the Somali regional state, in the northeast by Kersa district and in the southeast by Badano district (Figure 2.2). The administrative capital of the district is Chalanko. It is situated between geographic coordinates of 9° 32′ 00′′ N and 41°45′25′′E with altitude that spans between 1200-2140 meters above sea level.

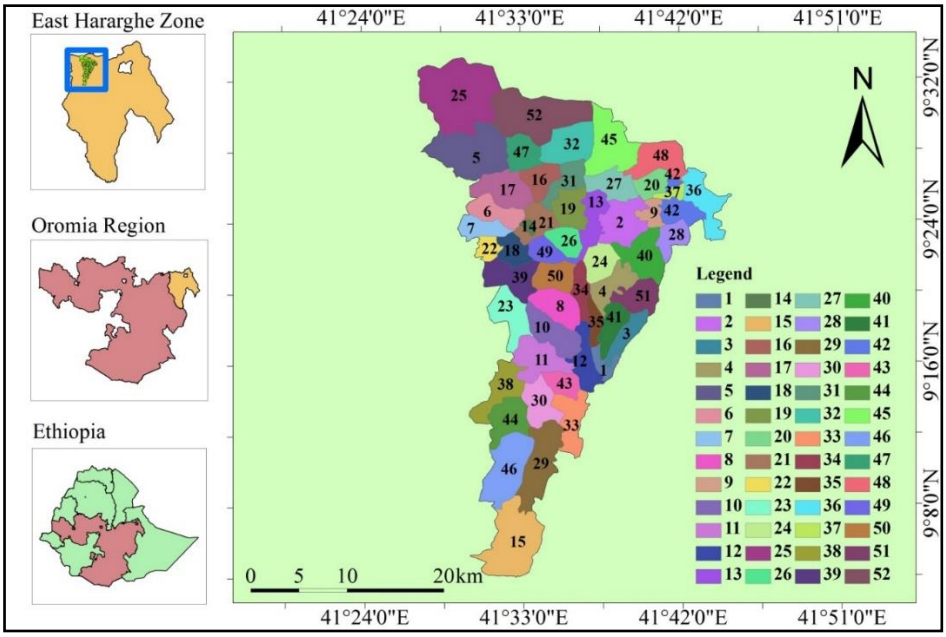

Figure 2.2 Map of Meta district and its administrative *kebeles*.

Although the district forms part of the eastern plateau, locally dominant landforms differ from place to place. Accordingly, the topography of the district ranges from nearly flat land to moderately steep land with the latter occupying the largest proportion of the total area. The major landforms vary from valley floors around river courses, plain, and plateaus to extremely undulating and dissected medium gradient hills and mountains. In most parts of the district, a saucer-shaped landscape, with the hills and slopes surrounding the low-lying areas, is very common. The major proportion of the district is sloping land. Because of this, the land that is naturally suitable for agriculture does not exceed 20-30 percent of the total area in the district. However, due to high population pressure, even the very steep slopes (>30 percent) and some marshy areas are being cultivated. This means agriculture is expanding to the steep parts of some isolated hills. The plate below shows the typical landforms in the district.

The total population of the district is estimated at 252,269, of whom 127,371 are men and 124,898 are women (CSA, 2007). About 94 percent of the population lives in the rural areas. The district contains 52 *kebeles* and has a total area of 75332 ha with average coverage of 1449 ha. The largest *kebel* covers 4902 ha and the smallest *kebel* has 169 ha. Similar to most other districts in Hararghe region, the agriculturally suitable areas of the district are densely populated.

*ii) Climate:* The district is characterized by low, mid, and highland agro-ecological zones. Data obtained from Qulubi Meteorological station, located some 10 kilometers from the district town (Chalanko), indicates that the long-term (1980-2014) mean annual rainfall was 988 mm and ranged from 534 to 1322 mm, suggesting the existence of high variability of rainfall in the area. The rainfall pattern in the district is bimodal. The small rainy season starts around February/March and extends to May, whereas the main rainy season stretches from end of June to September (Figure 3). The mean annual minimum and maximum temperatures of the same period are about 11 and 22°C, respectively, with the monthly values varying from 9-11°C and 20-24°C, respectively (Figure 2.4). As it can be seen from Figure 3, it is only during the months of April, July, and August that the rainfall exceeds the reference crop evapotranspiration. Due to this uneven distribution, terminal moisture stress is a critical problem in the district. This

requires harvesting excess water during the rainy season and using it (in the form of supplementary irrigation) during the latter stages when the rain ceases.

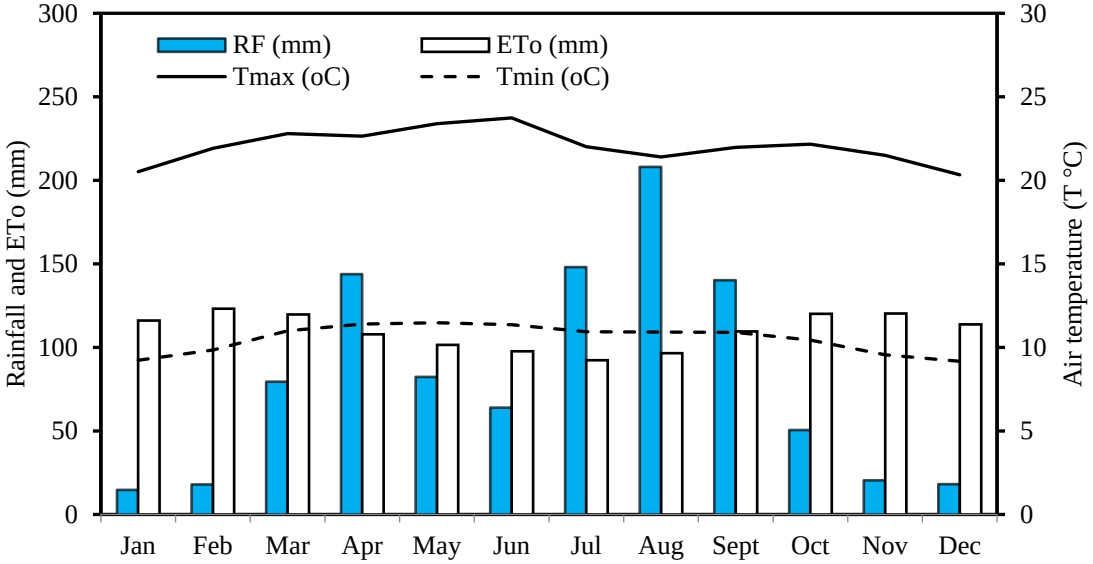


Figure 2.4 Long term mean monthly rainfall, maximum, and minimum temperatures (1980-2014) of Qulubi, Meta district.

Based on criteria used for Kombolcha district, Bakalcha Oromia (representing the highland agro-ecology) and Dursitu Bilisuma (representing the mid-land agro-ecology) are selected for the proposed interventions in Meta district.

*iii) Vegetation:* Owing to the variation in agro-ecology, different types of vegetation, both trees, and bushes and shrubs, are common. The hills being rehabilitated are covered by replanted and natural vegetation, which are mainly composed of *Juniperus procera*, *Olea oleaster*, *Podocarpus totara*, *Ficus sur,* and *Accacia abyssinica.* Cactus (e.g., *Opuntia ficus-indica and Ceres jamacaru*) and *Lanthana camara* are the dominant species on the degraded lands of the district. Common trees around homesteads include eucalyptus trees such as *Eucalyptus globulus* and *Eucalyptus camaldulensis*. Some agro-forestry tree species such as *Acacia abyssinica* and *Croton macrostachyus* are found on individual farmers' fields.

Meta district is densely populated, 366 persons/km$^2$. As a result, per capita landholding is very small. This has compelled the farmers to cultivate steep slopes. On steep slopes, food crops such as sorghum and maize, often intercropped with khat, are commonly grown. Farmers actually use some soil and water conservation practices, such as stone bunds and terraces, to cultivate steep slopes. Some land, which is covered by rock outcrops and vestigial vegetation, have been recently undergoing rehabilitation through the participatory community-based watershed management program being implemented across the country for almost the last ten years.

*iv) Farming systems:* The major agricultural lands are concentrated at the middle, lower, and foot of hills. On these slopes, almost every piece of land is cultivated. Although the agricultural activity is mainly rain-fed, small-scale irrigation is also widely practised. Mixed crop production and livestock rearing characterize the farming system of the district. The dominant field crops grown include sorghum, maize, *teff*, wheat, barley, faba bean, field pea, common bean, and some oil crops (e.g., linseed). Commonly grown horticultural crops include potato, onion, tomato, garlic, pepper, cabbage, and others. The vegetable crops are grown using both

rain-fed agriculture and irrigation during the off-seasons. As a result, they are grown as cash crops. Khat is grown almost everywhere both under rain-fed and irrigated conditions as the main cash crop. Coffee is also cultivated as a cash crop to a certain extent in the district.

Fertilizer application in the district is based on blanket recommendation of only about 100 kg Urea and 100 kg DAP $ha^{-1}$. This would amount only to 64 kg N and 20 kg P $ha^{-1}$, which is very low given the low availability of nitrogen and phosphorus in the soil and continuous removal of crop residues from farmlands for competing ends such as animal feed, fuel wood, and construction. The continuous removal of crop residues would result in little chance of replenishing nutrients removed by grains and plant biomass as well as poor status of soil organic matter. What is more, only nitrogen and phosphorus are applied to the soil in such small quantities whereas there could be other nutrients that are limiting in the soil. Application of organic matter in the form of compost or manure is common in the district. However, the rate of application of the organic fertilizers is very low due to low availability of the material (cow dung and composting material). This means that the rate of nutrient mining from the soil is very high in the district. Intercropping is widely practised, with double cropping being used by some farmers. Some farmers also use quality seeds of improved sorghum, wheat, and potato varieties.

*v) Water resources:* There are some permanent rivers in the district. Notable among these is the river that supplies water to the town of Chalanko. Besides, there are many perennial springs originating from below the mountains and crossing the valleys. There is also a lake in the district. Groundwater resources also exist. Decline in yield has been observed in response to fertilizer application perhaps due to the osmotic effects of the applied fertilizer under the moisture stress.

*vi) Markets and extension services:* Access to market is a key factor for increasing agricultural productivity and income. The district town, Chalanko, is located on the main highway to Harar and Dire Dawa cities. As a result, *kebeles* that are closer to the high way have better access to market. Although there is a good all weather rural road network linking the *kebeles*, farmers living in the remote areas of the district still have limited access to market and market information.

Farmers Training Centers (FTCs) are instrumental in promoting agricultural knowledge and technologies. Each *kebele* in the district has an FTC with the aim of providing practical training for farmers and demonstrating technologies. Three DAs are assigned to each *kebele*. Microfinance services, cooperatives, a hospital, and other health centers are also available in the district.

## 2.3 Problem analysis

The various aspects of InnovAfrica project context, i.e. its ecological, nutritional and socioeconomic dimensions should be well understood before a development operation is initiated**.** The common methods used to understand the context is conducting using a problem tree. A problem tree requires the selection of core problem (the stem) defining its causes (the roots) and consequences or effects (the branches). Hence, the core problems, their causes and effects facing smallholder farmers in Kombolcha and Meta districts are presented in Annex Table 1. The InnovAfrica project in Ethiopia will address problem areas mentioned under high priority (Table 3.2).

Table 3.2 Priority of problem settings

| High priority | Medium priority | Low priority |
|---|---|---|
| • Low agricultural production | • High population pressure | • Frost hazard |
| • Weeds, diseases, and insect pests | • Low access to quality seeds of improved and/or farmer preferred varieties | |
| • Moisture deficit during plant growth | • No site- & crop-specific fertilizer applications | |
| • Livestock feed shortage | • Post-harvest losses | |
| • Weak linkages among value chain actors | • Inadequate capacity in extension systems | |
| • Soil fertility depletion | • Limited livelihood diversification | |
| • Food and Nutrition insecurity | • low awareness of the nutritional values of crops produced and the importance of balanced diet | |

# 3 Promising SAIs, IIAs and EASs in the project sites

Due to wide differences in agro-ecology, soils, and farming systems, many sustainable agricultural intensification practices have been in use in Ethiopia. Cochrane (2014) made an extensive review on sustainable agricultural intensification practices in Ethiopia. The author concluded that the agricultural intensification practices have had significant impacts on agricultural productivity. The review also highlighted the gaps that still exist and need to be addressed. A common definition of sustainable intensification is *producing more outputs with more efficient use of all inputs – through various intensification processes on a durable basis – while reducing environmental damage and building resilience, natural capital and the flow of environmental services* (The Montpellier Panel, 2013).

*Some of the sustainable agricultural intensification practices that have been in use in Ethiopia as well as in the study areas include:*

- Crop intensification (intercropping often *khat* with sorghum, relay-cropping, crop rotation),
- Cultivation practices (row planting, conservation tillage),
- Integrated management of soil fertility
- Soil and water conservation practice (using the watershed management approach),
- Crop-livestock integration
- Agroforestry
- Seed diversification, and
- Livelihood diversification and gender mainstreaming.

## 3.1 Sustainable Agriculture Intensifications (SAIs)

The SAIs that will be implemented in Kombolcha and Meta study sites are: *i) maize or sorghum-legume intercropping a*nd ii) *Brachiaria* forage-livestock system. The farmer-led field experimentation will be implemented in four *kebeles* (two per site) in the study districts. The *kebeles* selected from Kombolcha are Bilisuma and Egu, while those selected from Meta are Bakalcha Oromia and Dursitu Bilusuma. Hundred trials (50 per site) will be conducted in the two districts. The farmers, with whom the trials are to be conducted, will be selected by involving development agents and other relevant stakeholders. The selection of farmers will be

done based on willingness, accessibility, progressiveness, technology-sensitivity, forward looking attitude, etc.

Seeds of an orange maize variety will be provided by CIMMYT. Local maize variety BH-661 will also be used as a control. Maize and legume cultivars/varieties that will be used in the experiment will be selected from among the local varieties. In addition, seeds of three Brachiaria cultivars that are suitable for East African environment will be provided by ILRI-BecA. The three cultivars of Brachiaria are: *Brachiaria decumbens* cv. Basilisk, *Brachiaria brizantha* cv. Piata, and *Brachiaria brizantha* cv. Xaraes. A local grass cultivar called Elephant grass (*Pennisetum purpureum*) will also be included for comparison. CIMMYT protocols for executing the field experimentation will be employed but with some adjustment to fit the local conditions. This is to maintain uniformity in trial designs, data collection and arrangements, monitoring and documenting innovations by farmers across the implementers of the work package (WP3.1). ILRI-BecA protocols for the field experimentation of Brachiaria grass will be used (see Annex 2).

## 3.2 Innovative Institutional Approaches (IIAs)

Innovative institutional approaches planned to be implemented in Ethiopia are multi-actor platform (MAPs) and integrated seed delivery system. This section highlights the selected IIAs.

### 3.2.1 Multi Actor Platform (MAP)

A regional multi-actor platform was established during the case country meeting held from 21 to 24 August 2017. MAP members include

- Oda Bultum Farmers' Cooperative Union,
- Afran Qallo Farmers' Cooperative Union,
- East Hararghe Zone Office of Agriculture and Natural Resources,
- Oromia Agricultural Research Institute, and
- Oromia Agricultural Output Marking Enterprise.

Representatives of the aforementioned MAP members have signed the Terms of Reference (ToR) and a memorandum of understanding with InnovAfrica, Haramaya University during the case country inception meeting. The members of the platform are expected to involve in planning, validation, progress monitoring and evaluation, designing scaling up strategies, providing inputs to innovative policy framework, and identifying key strategic value chain pathways. The platform could take up additional stakeholders to address various concerns of agricultural production and value chain issues. The involvement of key stakeholders in the project will guarantee the relevance of project interventions and create conditions for rapid uptake of technologies.

*Modalities for Engaging MAP Members:* The MAP is chaired by the InnovAfrica country manager. There shall be at least two MAP meetings per year. In addition, MAP members will also be involved in community discussions in each project site. They also involve in field monitoring and evaluation at the project sites.

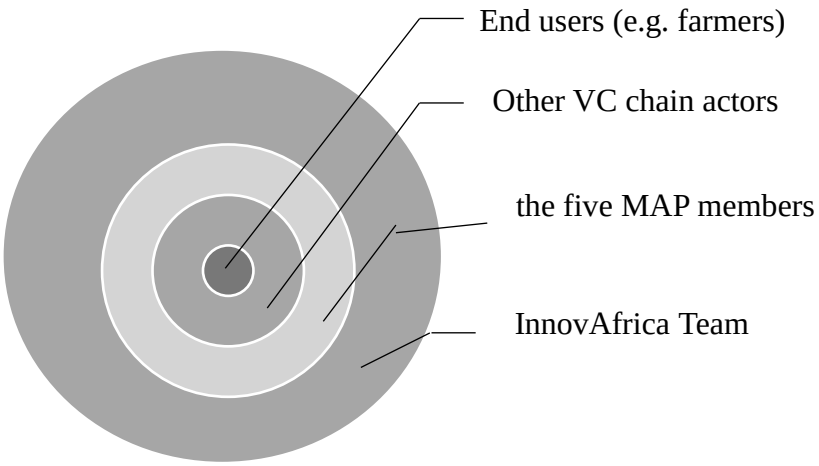

Figure 4.1 Interlinkages among the MAPs members and to InnovAfrica project team

InnovAfrica project team members in Ethiopia will take the lead in implementing project activities in the target areas. MAP members will be activity involved in most of the decisions and other stakeholders will participate in appraising and consolidating the decisions by providing feedback. Ultimately, end-users of project outcomes will be smallholder farmers and other value chain actors like traders (retailers, wholesalers, and exporters) as well as processors and consumers.


MAPs members and the project team in Ethiopia.

MAP is established with the following objectives:

- Securing stakeholder involvement and empowerment in the project
- Guiding end-users by providing information, facilitate training, backstopping, etc. and receiving feedback from them
- Developing a dialogue and fostering linkages among the scientific community, policy-makers, managers, end-users and the public within the context of the InnovAfrica project
- Ensuring effective development, uptake of the project outcomes, and sustainability of generated and/or disseminated technologies

**Box 4.1:** The main roles and responsibilities of MAP members and expected outcomes

*MAP members role*:

- InnovAfrica team at Haramaya University shall lead the MAP and the other members of the MAP actively engage in the required project activities and serve alternately as secretary of the platform.
- All MAP members shall involve in selection and prioritization of interventions that best fit in the project's target areas.
- All MAP members shall create enabling environment for implementation, market uptake, and sustainable financing.
- All MAP members shall involve in monitoring and evaluation.

*MAP outcomes*

- Engaged/committed user community
- Broadened understanding and sustainability of implemented SAIs, IIAs, and EASs
- Improved research and policy directions
- Viable product value chain
- Strong networking and collaborations among MAP members and other stakeholders

The MAP is basically meant to support InnovAfrica project during the lifespan of the project. However, its operation may go beyond the projects lifespan to ensure sustainability of utilizing generated and/or disseminated technologies by the farming communities and other beneficiaries. The MAP may involve in supporting other interventions outside of InnovAfrica project in the target areas as deemed necessary.

Table 4.1 Members of MAPs: their major roles and level of engagement in InnovAfrica project.

| MAPs | Major roles in InnovAfrica | Level of engagement | | | |
|---|---|---|---|---|---|
| | | Inform | Consult | Involve | Colla-borate |
| Oda Bultum Farmers' Cooperative Union | Strengthening of farmer groups under their jurisdiction | | | X | |
| | Sharing of knowledge and experiences in SAI, and mobilizing and sensitizing the community | | X | | |
| Afran Qallo Farmers' Cooperative Union | Supplying agricultural inputs like seed, fertilizers, and other agro-chemicals. | | | | X |
| | The cooperative union will also link farmers to produce markets. | | | | X |
| | Facilitating cross-fertilization of ideas and co-learning | | X | X | |
| East Hararghe Zone Office of Agriculture & Natural Resources | Mobilizing farmers, development agents, and other stakeholders in the project sites during implementation, demonstration, and field days. | | | X | |
| | Participating in validation & up-scaling innovative SAIs, EASs & IIAs | | | X | |
| | Supporting transfer and dissemination of knowledge and skills and promoting their awareness | | | | X |
| | Participating in dissemination and upscaling of innovations and extension approaches | | | X | X |

| | | | | | |
|---|---|---|---|---|---|
| | Lobbying and advocating for farmer friendly policies at local, national, and regional levels | | | X | |
| | Creating institutional linkages and synergies | | X | | |
| | Prioritizing existing critical challenges and their respective required interventions | X | | | |
| | Creating opportunities for participatory monitoring, learning, and evaluation | X | | | |
| Oromia Agricultural Research Institute | providing relevant agricultural technologies like improved seeds | | | X | |
| | providing training for farmers on agronomic practices, natural resource conservation, postharvest management, etc. | | | X | |
| | Imparting local knowledge and facilitating exchange visits among farmers | | | X | |
| | Providing quality assurance in preparing technical briefs/manuals/tool kits | | X | X | |
| | Aligning different actors in research and development endeavours | X | | | |
| Oromia Agricultural Output Marketing Enterprise | Providing price- and buyer-related market information and developing market value chains | | | | X |

During the first year of the project period, some MAP related activities will be done. These include developing operational procedures for the MAP, making field exposure visits to pilot sites, and conducting MAP meetings and peer reviews. During the remaining years of the project period, other MAP activities will be done, which include participating in consortium meetings, conducting stakeholder meetings, and writing policy briefs (Table 4.1).

Methods of engagement of MAPs members based on appropriate levels of engagement in the project

| Level of engagement → | Inform | | Consult | Involve | | Collaborate |
|---|---|---|---|---|---|---|
| Method of engagement → / MAPs ↓ | Website / social media | News letter | Interview/ survey | Workshop | Field activity | Steering group |
| Oda Bultum Farmers' Cooperative Union | | X | X | | X | |
| Afran Qallo Farmers' Cooperative Union | | X | X | | X | |
| East Hararghe Zone Office of Agriculture & Natural Resources | X | | | X | | X |
| Oromia Agricultural Research Institute | X | | | X | | X |
| Oromia Agricultural Output Marketing Enterprise | | X | | X | | |

*Major actors/stakeholders and their expected contributions*
Table 4.1 presents a summary of major actors/stakeholders that are relevant to the successful implementation of the InnovAfrica project.

Table 4.1. Major actors in Kombolcha and Meta districts and their roles in InnovAfrica project

| Major Actors | Role in InnovAfrica project | Level of engagement | | | |
|---|---|---|---|---|---|
| | | Inform | Consult | Involve | Colla-borate |
| Farmers & their families | Demand articulation, activity planning, implementation, evaluation, and dissemination. Generally, involve in PIP | | | X | |
| Primary cooperatives & cooperative unions | Input supply, credit provision, market facilitation (including buying and networking), capacity building (e.g., training farmers on quality seed/beef/dairy production), introduction of new technologies, etc. | | | | X |
| Farmers' Research Extension Groups | Activity planning, implementing, evaluating, and disseminating research outputs | | | X | X |
| Local administration | Community mobilization, facilitation of collective action | | | X | X |
| Research Institutions | Technology supply, capacity building, technical backstopping, demonstration, and knowledge sharing | X | X | | |
| Government offices | Planning, implementation, monitoring and evaluation, dissemination and scaling up, market linkages facilitation, capacity building, etc. | X | | | X |
| NGOs and projects | Knowledge sharing, capacity building, scaling up | X | | | X |

Note: Research Institutions include Haramaya University, Fedis Research Center, Melkassa Agricultural Research Centre, and Institute of Biodiversity. Government offices are Office of agriculture and natural Resources, Office of Livestock and Fishery Resources, Irrigation Office, Cooperative Promotion Office, Health Office, and TVET). NGOs and projects (CARE-Ethiopia, USAID, ISSD, Action Aid, ATA, HCS)

### 3.2.2 Integrated Seed Delivery System

Unlike the linear model, integrated seed sector development model recognizes the importance of co-existence of formal and informal seed sectors to cater for diversity of needs. It also promotes pluralistic seed policies and regulations in the context of different agricultural systems operating within each country. It also works on gender mainstreaming in seed sector development. InnovAfrica will capitalize on experiences gained from the ISSD (Integrated Seed Sector Development) project that has been implemented over the past seven years in Ethiopia.

The integrated seed delivery system planned to be implemented by InnovAfrica project sites will focus on strengthening community-based seed system including seed education, postharvest technology, seed exchange, and seed quality assurance and enabling policies to seed systems. Activities planned for the first year for strengthening community-based seed system include training lead farmers on quality seed production, management, and exchange, and facilitating targeted farmers access to quality seed of preferred or improved crop varieties.

### 3.3 Extension and Advisory Services (EASs)

As a new extension approach to be piloted in Ethiopia, Integrated Farm Plan [IFP, also called *Plan Intégré du Paysan* in French] will be implemented in the two project sites, Meta and Kombolcha. It will be implemented with a vision to the future as a tool for building a foundation for sustainable development, with the assumption that it will hasten horizontal scaling up of the SAI interventions.

Diverse activities will be integrated in IFP. The major components will be crop, livestock, natural resources, market, and household activities. The activities are expected to be implemented in an integrated way by selected innovative farmers. Efforts will be made to consider nutrition-sensitive agricultural produces to meet the objective of improving household food and nutrition security. Two IFP villages will be identified (one in each project site). After creating awareness on the purpose and implementation of IFP among the cluster farmers, 10 innovative farmers will be selected from each project site (from cluster members) constituting of a total of 20 farmers. The selection will be based on willingness, land characteristics, and existing farm enterprises. During the selection, the proportion of participating men and women farmers will be equal. In addition, entire family members will also participate in the implementation. Two lead farmers from each project site (a total of four) will be selected based on their innovativeness, willingness, production potential and social status in the villages. The lead farmers will be integrated with case country team for proper follow up and implementation. They will be trained by the project staff so that they further train fellow IFP members. At least one project staff will participate in training to be held in Burundi in November 2017 so that the trained staff offers the training to the lead farmers.

Extension agents in the selected project sites will actively participate in the implementation of IFP. Involving extension agents will facilitate selection of lead farmers, other IFP members, and uptake of project interventions. To start the activities, the required changes for re-structuring the farming system will be designed. The designed farm plan will be implemented as of March 2018. Two IFP project staff, one each per project site, will be recruited. The assigned staff will closely monitor all project activities in the project sites. Farmer-to-farmer training will be organized and facilitated to foster experience sharing among farmers in the two project sites.

In the second year of the project, a farmer open field day will be organized in each IFP village to evaluate the outcome of the interventions. Farmer trainers and IFP champions will be certified and graduated. Second generation IFP farmers will be created in the next neighbouring villages to scale up the best practices. During years 3 and 4 of the project time, the major tasks will include consolidation and further dissemination of the innovations, formation of farmer entrepreneurial groups, conducting exchange visits with neighbouring villages and authorities, IFP competitions in neighbouring villages, assessment of the IFP approach based on the set criteria, assessment of the spreading of innovations, and validation and distribution of IFP Manual/Guidelines.

## 4 Agricultural value chains and actors

### 4.1 Value chain concepts and definitions

The term value chain was initially coined by Michael Porter in 1985 and, since then, it has become a useful analytical tool for understanding the relationships among actors in a stream of production, distribution, and consumption processes (Humphrey & Schmitz, 2002). Value

chains describe the full range of activities required to bring a product or service from conception, through the different phases of production (involving a combination of physical transformation and the input of various producer services), delivery to final consumers and final disposal after use (Kaplinsky & Morris, 2001). As opposed to the traditional exclusive focus on production, advances in the literature now stress the importance of value addition at each stage, thereby treating production as just one of the several value-adding components of the chain. For agricultural commodities especially, such additional points of adding value to the chain are considered a game changer for smallholder farmers if properly approached. Hence, an intervention on SAIs cannot be an end on its own. Farmers must be linked to a fair market to enable them to get a reasonable margin of profit that is commensurate with the efforts they exerted in the production process. It is also necessary to create cooperation among all value chain actors to place all actors in a better position.

### 4.2 Value chains and actors in the project sites

It is, therefore, necessary to assess the current state of food value chains, identify key actors, service providers, and enablers in the sector; identify barriers/bottlenecks to farmers' participation in the value chain process in the project sites; develop strategies to promote value chains; and develop policy and institutional guidelines for value chains.

For the first year, key actors, service providers, and enabling environment along the value chain will be identified. For this purpose, data obtained from the questionnaire survey and focus group discussions will be utilized. Both qualitative and quantitative data will be collected. Semi-structured interviews will be conducted by involving key actors in the value chains in order to triangulate the information obtained through a household survey. Furthermore, additional information will be generated using key informant interviews in the selected project sites. Literature review will also be done. Secondary data on price and related variables will also be collected from relevant sources like Central Statistical Authority (CSA). This activity will be finalized in December 2017.

During the process, data will be collected from value chain actors (input providers/dealers, farmers, processors, traders at different levels, government officials, researchers, etc.), lead farmers and women/youth representatives in the two project sites. Under the input supply, seed delivery systems, agrochemical utilization, and provision of other inputs will be assessed. At the producers' end, production of different crops including potato, maize, sorghum, and different vegetables will be considered. From the marketing side, traders, assemblers, wholesalers, retailers, and exporters will be considered. Furthermore, secondary actors who deliver support services for primary actors such as transportation, brokerage, training, advisory, and information delivery will be considered. In the process, major opportunities to be exploited, challenges hindering the sector, where improvement are needed and lessons to be drawn there from will be identified.

*Value chain analysis*: Before suggesting any interventions to improve value chains (VCs), value chain analysis should be carried out to characterize, describe and understand the various actors along the product chain (FAO and CFC, 2010). Value chain analysis will be made for selected crops. The selection will be based on the potential to increase smallholder incomes, existence of a growing market demand for the produces, and potential for employment generation. Maize, sorghum, common bean, potato, and other vegetables will be considered as these are among the major crops produced in the selected project sites. Value chain maps will be sketched based on the data collected to show the relevant actors, enabling environment, and service providers.

Analysis will be made using both qualitative and quantitative analytical tools (statistical and econometric analyses).

In the second and third years, factors like household characteristics related to assets, demographic characteristics, farm structures, and institutions affecting participation in value chains (access to inputs and output markets) will be assessed. In addition, strategies for promoting value chains will be designed following the identification of barriers to participation in value chains. Furthermore, actions for changing policies and upgrading market services will be identified and implemented by involving MAP members; and policy and institutional guidelines to implement the necessary improvements along the value chains will be developed.

# 5 Agriculture policies and institutions related to Seeds and Extension Systems

## 5.1 Agriculture policies

Ethiopia's economic growth strategy, Agriculture Development Led Industrialization (ADLI), which was formulated in 1991, places a very high priority on accelerating agricultural growth and achieving food security. A core goal of the strategy is to raise cereal yields through a centralized and aggressive extension-based push focusing on technological packages that combine credit, fertilizers, improved seeds, and better management practices (ATA and MoA, 2014). The government has been pursuing its ADLI strategy by enacting a series of policies seeking to generate:
i) A more supportive macroeconomic framework;
ii) Liberalized markets for agricultural products; and
iii) A strong extension- and credit-led push for intensification of food staples production using modern inputs, especially seed and fertilizer (IFPRI, 2007).

Agriculture is also a focus of the government's poverty reduction strategy, which includes
- The Sustainable Development and Poverty Reduction Program (SDPRP) approved in 2002,
- The 2004 Food Security Strategy (FSS),
- The 2006 Accelerated and Sustained Development to End Poverty (PASDEP), and
- The Agricultural Growth Program (AGP) of Growth and Transformation Plan (GTP) (designed in 2010) (Mofed, 2006; Belay, 2015; Birhanu *et al*., 2016).

Ethiopia's rural development policy and strategies prioritize the transformation of smallholder subsistence agriculture to market-orientated production. To facilitate the transformation of agriculture, the government has established the Agricultural Transformation Agency (ATA) in 2010 to support the Ministry of Agriculture (MoA) and other implementing partners to achieve national targets for poverty reduction, food security, and growth by removing systemic bottlenecks in the sector (ATA and MoA, 2014). The current policies in the country which are more relevant to InnovAfrica project's intervention are the followings:

## 5.2 Seed systems and its policies

The Ethiopian seed system is governed by policies stipulated in the public proclamations and regulations that were put in place in the early 1990s (Dawit and Trip *et al*., 2010). The mandate of implementing these policies is given to the Ministry of Agriculture and Rural Development (MoARD) at the federal level and to Bureaus of Agriculture and Rural Development (BoARDs) at the regional levels (Future Agricultures, 2012).

*i) Informal and Formal Seed Systems*

Ethiopian farmers are prominently reliant on informal seed provision and local varieties (with no legal certification), which includes seed saved and retained by farmers, farmer-to-farmer seed exchange, and cooperative or Non-Governmental Organizations (NGO)-based seed multiplication and distribution. The formal seed system, on the other hand, involves the production and distribution of basic seed by the research system and certified seed by licensed multipliers for e.g. the Ethiopian Seed Enterprise, ESE), regional seed enterprises, and private seed companies (Future Agricultures, 2012).

Formal breeding and seed multiplication activities were conducted on ad-hoc basis until the first half of the 1970s. In 1976, the National Seed Council (NSC) was set up to formulate recommendations for seed production in the formal sector and the release of varieties from the national research programs (Belay, 2002). Afterwards, the Ethiopian Seed Corporation, later renamed the Ethiopian Seed Enterprise (ESE), was established as a fully government-owned para-statal body designed to undertake seed production, processing, and distribution, while regulatory functions were managed under the aegis of the Ministry of Agriculture (IFPRI, 2007).

Ethiopia's formal seed market is still driven by the public sector. The national research system (NARS), led by the Ethiopian Institute of Agricultural Research (EIAR) and many regional research institutes and higher learning institutions, provides seeds of improved varieties in the form of basic (foundation) or breeder seeds. The ESE and regional seed enterprises multiply seed in response to official demand projections articulated by regional bureaus of agriculture (IFPRI, 2007; Future Agricultures, 2012).

The private sector is a limited force in Ethiopia's seed market. In 2004, although there were 26 firms licensed to produce, 33 to retail, and four to export seed, only eight firms were active in seed production. This lack of involvement of the private sector could be seen even in the hybrid maize seed sector, which has been largely privatized in many other low-income countries (IFPRI, 2007). Since 2004, approximately 70 percent of maize seed has been produced by the ESE, while the remaining 30 percent has been produced by Pioneer Hi-Bred International and a handful of smaller firms under contract to ESE. For other crops, the ESE is practically the only formal producer of seed (IFPRI, 2007) before establishment of the regional seed enterprises.

*The Crash Seed Multiplication Program (CSMP):* CSMP was launched during the 2008/09 production season. The main objective of CSMP was to alleviate the serious shortage of improved seeds, particularly hybrid maize. The CSMP was top-down, centrally driven program that was run by the National Seed Multiplication and Distribution Committee (NSMDC). The committee was comprised of members drawn from the EIAR, ESE, and the Marketing Directorate of MoARD. For instance, Bako Agricultural Research Centre (focusing on maize research) was assigned to produce improved seeds (breeder, pre-basic seed) and to strengthen the capacity of other research centers to produce improved seed (breeder, pre-basic, and basic seed) of maize. State farms were allocated for production of basic seed and multiplication of certified seed during both the primary production season and the off-seasons. Overall, the supply of certified hybrid maize seed was increased from about 8700 tons in 2008/09 to an estimated 19300 tons by the 2010/11 production season.

*Farmer-based Seed Production and Marketing Schemes (FBSPMS):* In collaboration with the BoARD and as a complimentary program to CSMP, the ESE and Regional Seed Enterprises are implementing the FBSPMS. The FBSPMS is a decentralized, locally run farmer-based scheme. The purpose of its establishment was to improve the production of locally demanded crop varieties of importance for household and national food security which have less commercial appeal (staple food crops) and to increase the possibility of producing and marketing seed within communities, so reducing seed costs (Future Agricultures, 2012). Outcomes and impacts of FBSM approaches are:

- The schemes are playing an important role in the national formal seed system by being the main source of raw seed for the public seed enterprises.
- All emerging regional seed enterprises now base the production of Open Pollinated Variety (OPV) seed on FBSM.
- Much of the seed produced under FBSM is reused by farmers locally, resulting in low recovery rates by seed enterprises.
- Sustainability of the FBSM strategy remains a challenge as the system relies heavily on external supports, intensive training of farmers, and supervision, quality control and overall management.
- Additional challenges include the difficulty of contract enforcement and price risks.

*Fertilizer and credit policies*

Unlike seed, fertilizer is a private good that should be well suited to private market development in Ethiopia. However, a number of features of fertilizer have complicated market development in the early stages of adoption. On the demand side, fertilizer is a highly specialized input, the efficient use of which generally requires complementary inputs (e.g. improved varieties), sufficient rain, as well as higher levels of management. On the supply side, fertilizer is a bulky input, with relatively low value to volume. Due to these constraints on both demand and supply sides, public interventions in fertilizer markets are common in the early stage of market development (IFPRI, 2007).

Under the military regime (1974-1991), the private sector was excluded from participation in this sector, while fertilizer was subsidized by the state, and special credit programs were put in place to encourage fertilizer use. The Agricultural Inputs Supply Corporation (AISCO), established in 1984, was the sole importer and distributor of fertilizers to cooperatives and state farms. In the period following the fall of the military regime, the private sector started to enter the fertilizer market. By 1993, the government issued the National Fertilizer Policy, which supported fertilizer market development. By 1996, the government launched the National Fertilizer Sector Project with financial support from the World Bank and other donors. This project supported fully liberalized pricing, the abolition of subsidies, and the regulation of fertilizer standards. AISCO's monopoly was abolished, and the organization was transformed into the Agricultural Inputs Supply Enterprise, AISE (IFPRI, 2007).

***Agricultural risk mitigation policies***

Both production and price variability are high for cereals in Ethiopia, and domestic price variability is higher than the corresponding variability in world prices. The wide fluctuations in grain prices from 1999 and during the 2002/03 drought have shown that use of modern inputs is risky in most areas of Ethiopia, as weather-related variability in yield has a negative impact on farmers' incentives to use fertilizer. Given the risks, producers are less likely to use yield enhancing inputs (or to use them at "recommended" levels), as this is unprofitable in poor-rainfall years. A generic estimate suggests that in a risky rainfall environment a risk-averse

farmer would reduce fertilizer use by 40 percent (World Bank, 2006), a figure that is probably representative of the situation in Ethiopia (Dercon and Christiaensen, 2005).

Risk mitigation measures are needed to facilitate the efficient use of inputs by farmers, and to alleviate the costs to consumers of short-term spikes in basic food prices (Rashid and Assefa, 2006). In recognition of this, the government has built a central commodity exchange system to address problems of market information and transaction costs and risks, and to exploit scale economies through cooperatives (Gabremedhin and Goggin, 2006). The commodity exchange and its associated institutions, such as the use of warehouse receipts, helped smooth prices and eventually allowed both farmers and traders to forward contract and lock in harvest prices (IFPRI, 2007).

During the first year of InnovAfrica project, public and private extension advisory service providers/actors will be identified and characterized. National policy support will also be described. Based on this information, agricultural institutions and policies will be mapped. In year two to year four, effect of the mapped agricultural institutions and policies on adoptions of SAIs technologies, EASs, and IIAs will be identified and documented. Structural and organizational constraints to adoption will also be identified using data that will be generated through a questionnaire survey and focus group discussions. A policy dialogue will be conducted with MAP members, and a policy manual will be drafted to identify effective adjustments in agricultural policies. Effective governance pathways will also be developed based on information generated from stakeholders' meeting and policy briefs.

### 5.3 Extension approaches

Ethiopia started agricultural extension services in the 1950s and since then various agricultural extension approaches have been promoted and implemented in various parts of the country. The country has recently devised a new Agricultural Extension Strategy (2017) consisting of nine pillars. These are:

- Strengthening FTCs through active participation of community and capacity building;
- Enhancing agricultural knowledge and information systems;
- Enhancing client-oriented and multi-actor's advisory extension services;
- Facilitating market linkages and enhancing VC development;
- Mainstreaming gender, youth, and nutrition;
- Enhancing environmental management and sustainability;
- Enhancing institutional arrangements, coordination and linkages among key agricultural development partners;
- Developing and utilizing human resources for effective extension service delivery; and
- Establishing strong and dynamic result-based monitoring, evaluation, and learning for continuous improvement of extension service delivery.

Even though the provision of agricultural advisory services was traditionally a public-sector activity, new actors have entered the scene to provide and finance advisory services, including non-governmental organizations, farmer organizations, academic/research institutions, private providers, commercial companies, and community-based organizations (Belay, 2015). In 2015, a new strategy was developed to reinvigorate and revitalize ADPLAC and to strengthen linkages among agricultural stakeholders and facilitate the ground for strengthening agricultural advisory services in Ethiopia (Birhanu *et al.*, 2016; Belay, 2015). The existing structure of agricultural extension system of Ethiopia is shown in Figure 5.1 below.

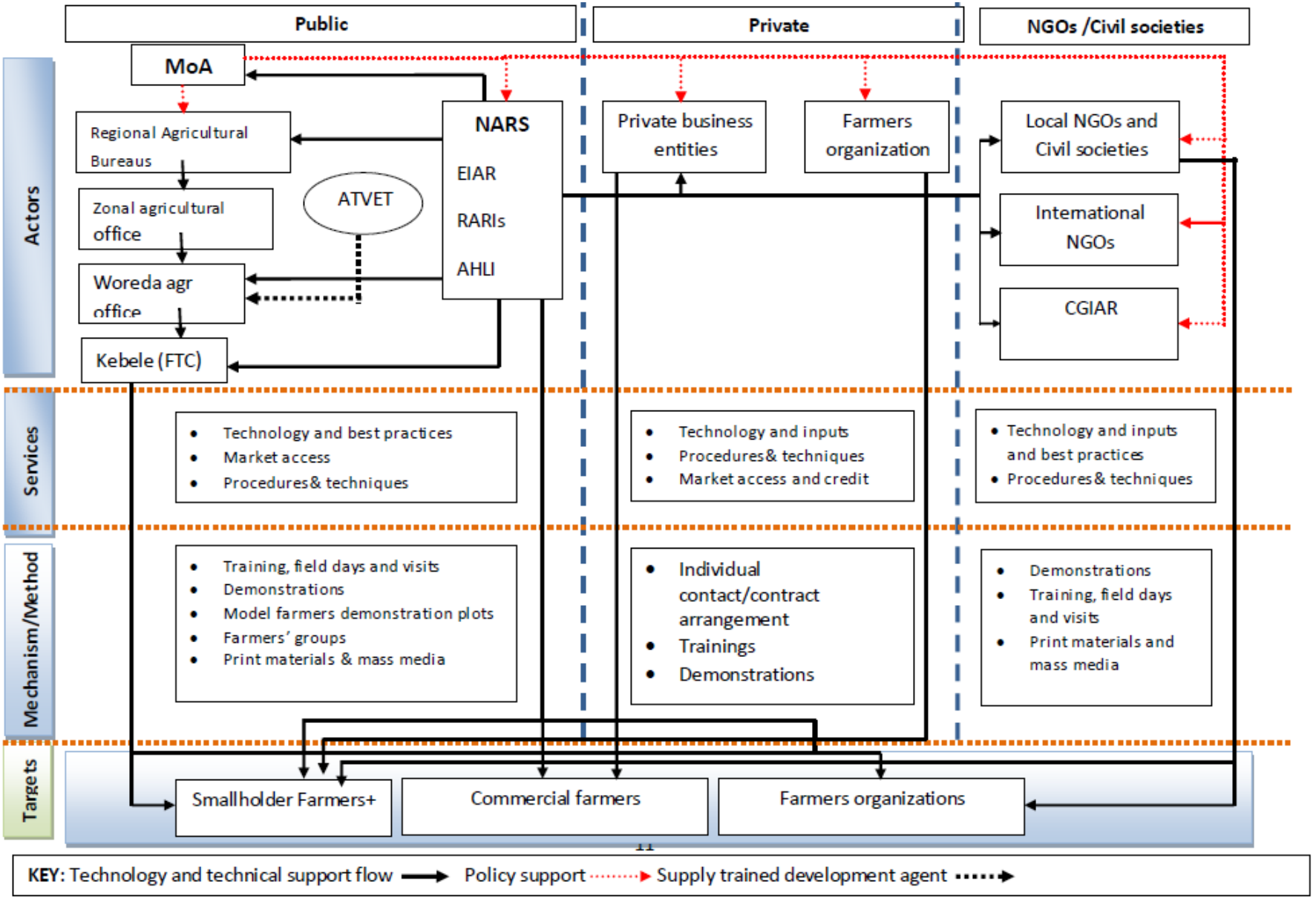


Figure 5.1 Map of Agricultural Advisory Service System of Ethiopia. Source: adapted from Belay (2015)

# 6 Gender mainstreaming

## 6.1 The state of Gender mainstreaming

Ethiopia is a country with more than 80 different ethnic groups each with its own language, culture, custom, and tradition. In the country, women are estimated to be about 50 percent of the total population (a little over 100 million in 2017). In addition, as indicated in IFPRI (2014), women make up about half of the labour force in Ethiopia. While their contributions are significant, women face discrimination when accessing and making decisions regarding education, agricultural information and inputs, land, and other assets, which aid food production.

As stated in UN (2002), gender mainstreaming is essential for securing human rights and social justice for human beings. Incorporating gender perspectives in different areas of development ensures the effective achievement of other social and economic goals. As stated in Ministry of Women's Affair (2006), gender inequality is rooted in social, economic, cultural and political structures and thus closely linked with every development challenge. Recent data of UNDP (2016) shows that in terms of gender equality, Ethiopia has made greater progress in the last two decades than ever before though it has to go a long distance yet. As one of the evidences for this, in 2015, Ethiopia's Gender Inequality Index was 0.499 and it was ranked 116$^{th}$ out of 188 countries in UNDP's Gender Inequality Index (GII) rank. The document shows that among females who are aged 25 and above, only 10 percent had at least some secondary education, compared to 20.7 percent of males of the same age group, with labor force participation rate of 70 percent for females and 89.1 percent for males; share of seats in parliament held by women is 37.3 percent. These are some of the indicators of great disparity between men and women.

Gender division of labor in rural Ethiopia varies in terms of farming systems, cultural settings, location, and the different wealth categories, ethnicity, and income status (Asfaw *et al.*, 2016). Ethiopian rural women spend longer hours in productive and reproductive tasks. Despite their contribution, their role in agricultural production is invisible and considered as a wifely duty and taken as secondary. In addition, women have been subjected to various forms of gender-based discrimination, which in many dimensions have had impact on their economic, political, and social status. They have limited access to and control over key factors of production. The country's rural women often face more difficulties than men in gaining access to and control over resources due to various reasons although it is culture-and time-specific (Anteneh, 2008). Most of the people living in chronic poverty in Ethiopia are rural women.

The government of Ethiopia has implemented several policies and legal reforms to enable gender mainstreaming. It has acknowledged the critical role women's empowerment plays in achieving its development goals and has introduced various legal and policy reforms. For example, the GTP considers the promotion of women, youth, and other vulnerable groups a critical step in accomplishing its development goals. One of the challenges it tackles is removing obstacles that prevent rural women's ability to participate in the economy through strengthening extension services to women farmers. The GTP also plans to target women and youth to participate in non-farm income generating activities (Helina, 2015).

The Ministry of Agriculture (MoA) of Ethiopia has designed gender inclusive agricultural policies and established Women and Youth Affairs Directorate (WYAD) to facilitate gender mainstreaming process and women and youth empowerment in the agriculture sector. All departments under the MoA are also supposed to take their own actions to pursue gender mainstreaming initiatives in their own operational programs. Among these is Agricultural Extension Department, which is making efforts to mainstream gender in all its programs and involve women to benefit from agricultural extension services. In general, gender inclusive policy dimensions and provisions are already set in place and for women to exploit the benefits from agricultural extension and beyond. In spite of all the efforts and endeavors being made, much of it remains to ensure women participation and utilize the services of agricultural extension. Implementation of policy provisions has not ensured expected economic benefits to most of the rural women in getting out of the problem of poverty. Moreover, the standard guidelines and regulations established at national levels to help promote participation of rural women in agricultural extension services has not been cascaded to lower structures, such as regional, zonal, and district levels. The direction has only been given to implementers that 30 percent of the extension beneficiaries shall be women. Despite this provision, the reality happened to be that the extension services are not accessible to most of the rural women.

The extent of participation of women and the benefits accruing from extension services vary from district to district, and from *kebele* to *kebele* depending on the status of women, such as education, access to information, and others. Even within a district, women may participate more actively in one *kebele* than other kebeles, or in one district than other districts. Even among women, women in female-headed households have more access to participate in discussions on extension plans than women in male-headed households. This reveals lack of uniformity in the extent of gender mainstreaming in extension planning. Moreover, in cases where plans are designed with the participation of men and women together, it is likely that women got dominated by men, and that the interests of women remain missing without being considered in the plans (Women and Youth Affairs Directorate of Ministry of Agriculture and Agricultural Transformation Agency, 2015).

In general, the current government of Ethiopia has been working towards mainstreaming gender in all sector programs including agriculture. Specifically, mainstreaming gender in agriculture is a means by which both women and men will have equal access to opportunities in the sector so that both parties can fully benefit from outcomes of agricultural production. But many studies indicated that most of women's rights are good on documents, but little have been done in terms of implementation by taking these rights up in the country's development programs at the grass root level due to different constraints. Hence, the real problems of women are addressed little in the plans, leaving them still desperate for meaningful changes of their livelihoods. In this document, opportunities and major challenges in gender mainstreaming mainly in agricultural sector are reviewed and identified.

## 6.2 Challenges in mainstreaming gender

Several studies indicated challenges faced in women mainstreaming in agricultural research and extension services (Women and Youth Affairs Directorate of Ministry of Agriculture and Agricultural Transformation Agency of Ethiopia, 2015; Lemlem *et al.*, 2010).

*The main challenges in mainstreaming gender are:*

- Non-functionality of gender positions
- Limited capacity of gender experts and implementers
- Lack of gender sensitive monitoring and gender disaggregated data
- Limited/ unavailability of resources for gender promotion and supporting women
- Attitudes and cultural setup
- Inappropriate and lack of women-friendly technologies
- Limited understanding of real problems and needs of women
- Failure of identifying the right entry points
- Lack of committed drivers for change
- Top-down extension planning – missing the real needs of rural women
- Limited participation of women in management committees:

### 6.3 Opportunities for mainstreaming gender

Some of the opportunities identified by different sources in mainstreaming gender are stated as follows:

- The integration of gender in all sector ministries and government institutions, which include Commissions, Agencies and Institutions at all levels.
- Government's commitment to implement women's policy i.e. the establishment of structures in all the regions, sub-regions and at *Kebele level*.
- The emphasis given on gender issues to meet the 2030 Agenda for Sustainable Development Goals (i.e. SDGs 5).
- Developing educational gender programs in higher learning institutions.

Generally, the above issues indicate that fully integrating gender responsive programming requires strong commitment and interest at all levels, from policy planning to implementation. This commitment and interest can be developed through capacity enhancement. Gender mainstreaming requires changes in goals, strategies, and actions to ensure that both women and men can influence, participate in, and benefit from development processes. This may lead to changes in organizations' structures, procedures and cultures to create organizational environments conducive to the promotion of gender equality (UN, 2002).

Hence, InnovAfrica project emphasizes analysis of gender gap that examines the barriers to gender equity in agriculture, food and nutrition security, which will be followed by gender mainstreaming and enabling rural women and youth to benefit from their efforts in production activities. InnovAfrica will address some of the gender-related issues mentioned above by:

- Involving women in all InnovAfrica project work plans and ensuring gender equality. Gender equality will be promoted and actions taken to enhance women's participation in research and extension activities. Women will be involved in the planning and implementation of the project activities.

- Conducting gender-based analysis. Gender-based analysis will be conducted to inform policy makers and other concerned stakeholders to strategize and implement gender-sensitive activities and improve livelihood of rural women and youth.
- Integrating gender issues into training. Integrating gender issues into training to create better awareness and give equal opportunities for gender in all actions planned and activities conducted.

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## Annexes

Table 1: Problem area to be addressed, its causes and effects facing smallholders in Kombolcha district

| ***Problems*** | ***Causes*** | ***Effects*** |
|---|---|---|
| High population pressure | Poor family planning, low education opportunity especially for women | • Small and fragmented landholdings<br>• Encroachment of agricultural activity to steep slopes,<br>• Forest/vegetation cover are highly prone to degradation |
| Soil fertility depletion | • Continuous cultivation without properly nurturing the soil<br>• Competing use of organic materials | • Majority of the soils are generally low in Organic matter, Nitrogen and Phosphorus<br>• Deficient in certain micronutrients |
| Weeds, diseases, and insect pests | • Dry spells after short rainy seasons<br>• Climate change | • Maize and sorghum stalk borers, potato late blight, and wheat rust<br>• Outbreaks of armyworms and locusts |
| Frost | | • Significant yield losses in rainfed crops |
| Moisture deficit during plant growth | • Climate change | • Terminal moisture stress<br>• Significant yield reduction<br>• Makes rain-fed agriculture risk-prone |
| Feed shortage | • Land scarcity and long dry seasons<br>• Crop residues are used for other competing ends | • Animals can graze only in some pocket areas (valleys & steep slopes)<br>• Limited number of livestock per capita<br>• Undermines the contribution of livestock sector towards FNS |
| Low access to quality seeds of improved and/or farmer preferred varieties | • Lack of capital<br>• Not involving farmers in the research process | • Most of the cultivars are low yielding and disease/pest susceptible |
| No site- & crop-specific fertilizer applications | • No regular soil testing | • Tremendous yield reduction<br>• Farmers are reluctant to take up fertilizer recommendations.<br>• Using blanket fertilizer recommendations |
| Post-harvest losses | • Lack of appropriate storage facilities<br>• Value addition mechanisms | • High losses from harvests of fresh produces in distant markets |
| Inadequate capacity in extension systems | • Institutional and technical limitations of DAs<br>• Lack of logistics and financial supports | |
| Weak linkages among VC actors | • Poor infrastructural, information & market networking | • Provision of right inputs at the right time becomes a serious problem |
| Limited livelihood diversification | | • Farmers and their family do not have alternative jobs that generate income |
| Nutrition insecurity | • Limited awareness on improved food eating habit, diet plus nutritional value of foods | • Farmers sell their produce & buy less nutritious food items e.g. cookies & candies |

Table 2: Challenges in mainstreaming gender (source: Women and Youth Affairs Directorate, 2015)

| Challenges | Descriptions |
|---|---|
| • *Non-functionality of gender positions* | • Though gender positions have been well structured from regional to district levels, positions are not yet functional in most of the districts. |
| • *Limited capacity of gender experts and implementers* | • The gender experts themselves have scanty knowledge about gender, the skills of identifying gender issues and addressing gender related problems; inability of implementers in identifying women's real needs and mechanisms of involving them in extension initiatives. |
| • *Lack of gender sensitive monitoring and gender disaggregated data* | • Although policies show strong commitment to promote gender equality, quantitative data for gender-related indicators is not readily available. The evidence base with respect to gender roles, access to and control over resources as well as time use is not well developed. As a result, appropriate actions to strengthen economic and social policies are not sufficiently well-informed and used to develop improved policy and practice. |
| • *Limited/ unavailability of resources for gender promotion and supporting women* | • Limited operational budget allocation to gender units through formal extension at grassroots for gender promotion levels, in most cases. |
| • *Attitudes and cultural setup* | • In male dominated society, women are often believed to be passive recipients of information and technologies. They are not encouraged to express their needs and priorities in public, or their voices are not often heard. Even though, there are improvements over time, negative attitudes are still persistent at large, not only at the level of the community but also at different levels of implementers and officials. |
| • *Inappropriate and lack of women-friendly technologies* | • Most of the agricultural technologies available are not appropriate and responsive to the conditions and needs of women. While women require labor and time saving technologies to relieve their burdens, most of the technologies, instead, being time and labor demanding. Inappropriateness of the technologies is expected to result in resistance of women to adopt and utilize them. Considering their busy schedules both in domestic and field level responsibilities, women require productive, and labor and time saving technologies. |
| • *Limited understanding of real problems and needs of women* | • It is required to select appropriate extension approaches that fit the conditions of women. However, this has not been done in most of the cases and the formal extension system assumes that every approach works equally well for both men and women. To maximize benefits rendered through extension services, men, women in male headed households, female headed households and youths require approaches compatible to their circumstances, such as social status and cultural setup (socially dominant/subordinate), economic status (resourceful/poor), educational status (literate/illiterate), age (elderly, youths), previous experiences and exposure (exposed/not exposed) and others. |

| | |
|---|---|
| • *Failure of identifying the right entry points* | • Unless women's practical/immediate needs are addressed at priority levels, it has been reported that they would not be motivated to participate in extension services. Credit service is reported to be very crucial for women, especially for female-headed households, to engage in supplementary income generating activities. Women in male-headed households will also be sensitized to engage in and generate their own income if they can get easy access to credit services. However, it has been repeatedly reported that credit is not adequate for female-headed households and almost not accessible to women in male-headed households by their own. Women in male-headed households seek permission of their husbands and signature on the credit application formats to get the services. |
| • *Lack of committed drivers for change* | • Limited motivation of gender experts has also been reported as an obstacle to sensitize women and enhance their participation in extension services. Gender expert positions are not competitive as that of other parallel positions; no operational budget is allocated for them to discharge their responsibilities; low focus is given to gender experts by leaders; and many other factors have discouraged gender experts to strengthen their linkages with rural women. In general, limited commitment of leadership is reported to have discouraged and demotivated gender experts. |
| • *Top-down extension planning – missing the real needs of rural women* | • It has been reported that extension plans are drafted at higher levels and then cascaded to lower levels for customization. The real development needs of women are even almost missing from the plans. When they realize that their needs and priorities are not adequately addressed in the extension plans, it does not inspire them to participate in extension services. |
| • *Limited participation of women in management committees:* | • Though women are supposed to represent all the women members, committee membership is largely of nominal without being able to influence decisions towards the interests of women. This process discourages women from participation in meetings. One of the causes is attitudes of some communities which perceives "women cannot lead". Even women themselves acknowledge this attitude saying "we cannot lead as men do…. or let men decide whatever they feel since they know everything". |