

# QUICK SCAN ETHIOPIA



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## INTRODUCTION

Within the framework of food security policy, the Ministry of Foreign Affairs of The Netherlands is implementing the programme 'Geodata for Agriculture and Water (G4AW) Facility'. The G4AW Facility aims to increase the agricultural sector output in G4AW partner countries. This is achieved by providing food producers with relevant information, advice and/or (financial) products through operational information chains using satellite data.

In the summer of 2014, a new call for tenders will be opened. In this call, the Ministry of Foreign Affairs of The Netherlands calls for good quality project proposals from viable partnerships.

### **Goal of the Quick Scan**

The Quick Scan serves as input for preparing the country visit and the G4AW information and matchmaking workshop in Ethiopia. In the workshop the local context, constraints and challenges in agriculture will be discussed. Furthermore, the background and details of the G4AW Facility is provided and the development of partnerships is promoted.

This Quick Scan provides an up-to-date information assessment on agricultural and associated activities. It provides information from different perspectives and in a wider context (climate, water management). Additional, stakeholders from different types of organizations are identified and reported. The document is initially supporting the country visits and workshop, but the provided information can also contribute to the development of partnerships that are intending to bring forward a proposal in the second call of the G4AW Facility.

# 1 ASSESSMENT OF ETHIOPIA WITH A FOCUS ON AGRICULTURAL ISSUES

*Pressure on the agro-eco production systems caused by increased (overpopulation), climate changes and extreme weather conditions lead to a lack of natural local resilience. In this section, a general introduction as well as the most important challenges in the agro-eco systems in Ethiopia are given as well as an overview of (governmental) efforts to address the food security situation.*

**Geography:** Ethiopia is a land-locked country in the horn of Africa and geographically located between 30 and 140 North Latitude and 330 and 480 East Longitude with in the tropics. It is the 10th largest country in Africa, covering a land area 1.13 million Km<sup>2</sup> with great elevation variation from 100 meter below sea level in Kobar sink to the high peaks of Mountain Ras Dajen (4620m) above sea levels.

**Politics:** Ethiopia is a Federal Democratic Republic that is currently being ruled by the Ethiopian People's Revolutionary Democratic Front (EPRDF) party. According to the constitution, Ethiopia is divided in to nine National Regional States, 68 Zone administrations and 550 districts.

**The population:** Ethiopia, with a population about 85 million, is the 2nd most populated country in Africa after Nigeria (WB, 2007). The population growth of the country is still continued at an alarming rate. Recently Ethiopia stands 16th most populated country in the world with the estimated population of 88 million people.

**Climate:** Ethiopian climate varies according to the different topographical regions. The central plateau has a moderate climate with minimal seasonal temperature variation. The mean minimum during the coldest season is 6° C (43° F), while the mean maximum rarely exceeds 26° C (79° F). Temperature variations in the lowlands are much greater, and the heat in the desert and Red Sea coastal areas is extreme, with occasional highs of 60° C (140° F). Heavy rainfall occurs in most of the country during June, July, and August. The High Plateau also experiences a second, though much milder, rainy season between December and February. Average annual precipitation on the central plateau is roughly 122 cm (48 in). The northern provinces receive less rainfall, and the average annual precipitation in the Ogaden is less than 10 cm (4 in). The westernmost region of Ethiopia receives an annual rainfall of nearly 200 cm (80 in). Severe droughts affected the country in 1982–84, 1987–88, and 1991.

**Land use:** The hilly land has led to extensive terracing in some parts of the country. Of Ethiopia's total land area of 1,221,480 square kilometers, the government estimated in the late 1980s that 15 percent was under cultivation and 51 percent was pasture. It was also estimated that over 60 percent of the cultivated area was cropland. Forestland, most of it in the southwestern part of the country, accounted for 4 percent of the total land area, according to the government. These figures varied from those provided by the World Bank, which estimated that cropland, pasture, and forestland accounted for 13%, 41%, and 25%, respectively, of the total land area in 1987.

**Economic Activity:** is the foundation of the country's economy, accounting for half of gross domestic product (GDP), 83.9% of exports, and 80% of total employment. Ethiopia's agriculture is plagued by periodic drought, soil degradation caused by overgrazing, deforestation, high population density [citation needed], high levels of taxation and poor infrastructure (making it difficult and expensive to get goods to market). Yet agriculture is the country's most promising resource. A potential exists for self-sufficiency in grains and for export development in livestock, grains, vegetables, and fruits. As many as 4.6 million people need food assistance annually.

Agriculture accounts for 46.3% of the nation's Gross domestic Product (GDP), 83.9% of exports, and 80% of the labour force. Many other economic activities depend on agriculture, including marketing, processing, and export of agricultural products. Production is overwhelmingly of a subsistence nature, and a large part of commodity exports are provided by the small agricultural cash-crop sector. Principal crops include coffee, pulses (e.g., beans), oilseeds,

cereals, potatoes, sugarcane, and vegetables. Exports are almost entirely agricultural commodities, and coffee is the largest foreign exchange earner. Ethiopia is also Africa's second biggest maize producer. Ethiopia's livestock population is believed to be the largest in Africa, and in 2006/2007 livestock accounted for 10.6% of Ethiopia's export income, with leather and leather products making up 7.5% and live animals 3.1%.

**Water resources and use:** Ethiopia is endowed with a substantial amount of water resources. The surface water resource potential is impressive, but little developed. The country possesses twelve major river basins, which form four major drainage systems.

Integrated development master plan studies and related river basin surveys undertaken at the end of the 1990s indicate that the aggregate annual runoff from nine Ethiopian river basins is about 122 km<sup>3</sup>. The Abbay, Baro-Akobo and Omo-Gibe basins account for about 76 percent of the total runoff from an area that is only 32 percent of the total area of the country. Most of the rivers in Ethiopia are seasonal and about 70 percent of the total runoff is obtained during the period June-August. Dry season flow originates from springs which provide base flows for small-scale irrigation. The groundwater potential of the country is not known with any certainty, but so far only a small fraction of the groundwater has been developed and this mainly for local water supply purposes. Traditional wells are widely used by nomads. Neither desalinization nor treatment of wastewater is practiced in Ethiopia.

Intense rainfall sometimes causes flooding particularly along the Awash River and in the lower Baro-Akobo and Wabe-Shebelle river basins, causing damage to standing crops and infrastructures. The construction of dykes mitigated the problem but has not provided a long-lasting solution. Ethiopia has several lakes (an area of about 7 000 km<sup>2</sup>), a number of saline and crater lakes as well as several wetland areas. All the lakes, except Lake Tana which is the source of Abbay River in the Nile Basin, are found in the Rift Valley and among these lakes only Zway has fresh water while the others are all saline. Rising water levels in Lake Tana and Lake Awassa after intense rainfall have been creating concern. Large wetlands serve as a source of water for large rivers, flood retention and groundwater recharge. They are critical resources because they are areas of high biodiversity and are often vital to the livelihood strategies of local communities through the provision of environmental services and socio-economic benefits. Ethiopia has so far put no emphasis on developing and protecting the large wetlands, although external initiatives are emerging.

Ethiopia has many small, medium and large reservoir dams constructed for hydropower generation, irrigation and drinking water supply. Small dams are less than 15 m high and have a capacity of less than 3 million m<sup>3</sup>. The height of the medium and large dams in Ethiopia is 15-50 m and their capacity ranges from 4 to 1 900 million m<sup>3</sup>. Total dam capacity is estimated at 5.56 km<sup>3</sup>. Out of the nine larger dams two dams are used for hydropower generation only, one dam is used both for hydropower generation and irrigation.

## 1.1 MAIN CHALLENGES IN ETHIOPIAN AGRO-ECO SYSTEMS

### **Ethiopian agricultural sector**

The Ethiopian economy has registered rapid growth rates averaging 11% per annum over the past decade, placing the country among the top performing economies in Sub-Saharan Africa. The new 5-year Growth and Transformation Plan (GTP) envisages continuing growth of the Gross Domestic Product (GDP) at a minimum 10% per year.

Up to 12 million Ethiopians depend on food aid in any given year, a few million permanently and 7,2 million on food or cash for work under the Productive Safety Net Project (PSNP). It has been accepted that the overall food security situation has reasonably improved over the past two decades.

Agriculture is the leading sector of Ethiopia's economy as the overall economic growth of the country largely depends on the agricultural sector. The sector provides employment to 83% of the population, contributed 41.6% to the country's GDP in 2009/10 fiscal year, and 85% of its export earnings. Food security nonetheless remains a key challenge.

The agriculture sector largely depends on rain fed production and is dominated by smallholder farming systems with about 11.7 million households having access to less than 1 ha of arable land. Most agricultural production is used to meet household consumption needs and a significant number of households experience food shortages during the pre-harvest period.

In all farming systems, livestock is the single most important household asset and there is a strong correlation between lack of livestock ownership and poverty, particularly among female-headed households. Livestock production accounts for about 32% of agricultural GDP and draught animal power is critical for all farming systems.

The cultivation of cereals dominate Ethiopian agriculture as it accounts for about 70% of agricultural GDP. Over the past decade, cereal production has more than doubled to nearly 15 million tons as a result of horizontal expansion and increased yields. Nevertheless, food security remains a critical issue for many households and for the country as a whole. Moreover, expansion of the cropped area to more marginal lands has resulted in severe land degradation in some areas.

In the context of the current challenges faced in Ethiopia, such as food insecurity and conflicts, water plays a crucial role. In July 2011 the number of persons in need of humanitarian assistance reached 11.5 Million in Ethiopia, Somalia, Kenya and Djibouti. The looming famine was triggered by a series of relatively dry years. Due to climate change, rainfall will increase in parts of the region but rainfall patterns become more erratic resulting in more frequent droughts and floods. In large parts of the region the availability of water is mainly diminishing due to the overall natural resources degradation through erosion and unsustainable use of water, and for example by the invasive shrub *Prosopis Juliflora*. Generally the water storage capacity of the river basins are suboptimal because soil and water conservation measures are still insufficient resulting in low levels of water storage in the water-soil system and in lakes being filled up with sediments. Too high water abstraction for irrigation upstream is another problem in several river basins, leading to drying wetlands, lakes and rivers downstream. Investment in water harvesting, artificial storage and recharge infrastructure is so far limited, making the region vulnerable to drought. It also means that competing claims on water are a major driver of instability and a hindrance to sustainable development.

Although the pressures on existing water and land resources are high, there is significant potential for improvement. First of all improved *integrated water resources management*, including land use zoning, can help to prevent or resolve conflicts and to support the development of value chains for sustainable products and services. Secondly the *water availability* can be improved because there is scope to use water harvesting techniques and also the available groundwater resources, both shallow and deep, are not yet fully utilized. To use and enhance the available water resources in a sustainable and effective way, integrated watershed management is also crucial. A third important cluster of water issues is the *lack of reliable and safe water supply*, poor sanitation and hygiene (WASH) and water pollution. These issues are also important for economic development in the region, e.g. to attract foreign investment, to develop tourism, to prevent water borne diseases among the labor force, etc.

#### **Overview of Agricultural Developments and Activities (including Gender)**

For Ethiopia to achieve middle-income status by 2025 and make substantial inroads against food insecurity, concerted and strategic investment and strategic choices in the agricultural sector are vital. Concentrations of food insecurity and malnutrition are endemic in rural areas, with a population of six to seven million chronically food insecure, and up to 13 million seasonally food insecure. Over 90 percent of agricultural output is driven by

smallholder farmers. Without expanding cultivated land, and given forecast population growth, the average land holding size in highland areas will be reduced to 0.7 hectares by 2020.

Agriculture contributes substantially to the overall Ethiopian economy. On a nominal GDP of USD 25.6 billion, placing further pressure on rural incomes and food security. 43 percent was driven by the agricultural sector. Crop production accounts for 29 percent, with livestock at 12 percent, followed by the forestry sector with 4 percent. The sector contributed USD 1.4 billion to export earnings: crops and forestry account for 60 percent of overall export value, livestock for 28 percent, and remaining exports, a combination non-agricultural industry, primarily extractives and industrial production.

The sector also drives aggregate employment figures. Estimates show 83 percent of the population relies on agriculture for their livelihoods (with many more dependent on agriculture-related cottage industries such as textiles). To date, employment data is not disaggregated by gender, but participation of women, particularly in crop production, ranges from 45 to 75 percent based on the crop and stage of production.

The role of gender in the Ethiopian agricultural system is also critical: in post-harvest activities for cereals, women contribute as much as 70 percent of on-farm labor; in marketing, particularly in cereals, participation of women is as high as 60 percent of labor market share. While Ministry of Agriculture and Rural Development (MoARD) strategies do identify the role of women in the agricultural value chain, the gap is in the implementation of these strategies. Plan for Accelerated and Sustained Development to End Poverty (PASDEP II) has already identified targets for the participation of women in cooperatives and unions (>30 percent), as well as the number of women targeted by public extension in male-headed and female-headed households, 50 percent and 100 percent, respectively. Given the stakes of women in production systems, specific strategies that target increasing the opportunity of women to participate in income generation and decision-making, and the disaggregation of data sets to capture the participation of women are critical.

## 1.2 GOVERNMENTAL EFFORTS AND POLICY ON FOOD SECURITY

Agricultural Development Led Industrialisation (ADLI) is a central pillar of economic policy in the recently completed Plan for Accelerated and Sustained Development to End Poverty (PASDEP) and the soon-to-be launched Five Year Growth and Transformation Plan (FYGTP). In the agricultural sector, Ethiopia has a comprehensive and consistent set of policies, strategies and programs, which reflects the importance of the sector in the Nation's development aspirations. The institutional capacity to implement these, however, is generally limited.

**PASDEP I** – (launched in 2006) focused on a set of drivers in the agricultural sector: strengthening human resources for implementation, ensuring the prudent allocation and use of existing land, adapting of approaches to agro-ecologies, diversifying and commercializing of production, integrating agricultural activities with other sectors, establishing effective *marketing systems*, and *promoting sustainable natural resource management particularly with climate adaptation*. The Plan achieved an important set of outcomes, including sustained growth in cereal productivity and the ambitious expansion of human resource capacities in the frontline delivery of extension services.

**PASDEP II** – (launched in 2010) has a similar set of priorities focused on capacity building of smallholder farmers, with quality improvements in frontline extension; enhanced conservation of natural resources; improved frameworks for the involvement of private investors; and ensuring that productivity gains are sustainable and that inroads are made against food insecurity at the individual and national levels. The recommendations and implementation strategy contained in this report are intended to accelerate the progress and impact of the PASDEP II, by enabling a systemic infrastructure for capacity development and innovation across the agricultural sector.



**Comprehensive African Agricultural Development Program (CAADP)** – the Ethiopian government adopted their CAADP Compact in September 2009. The Compact provides the country-level strategic plan for alignment with the regional CAADP process, committed to by African heads of state at the African Union annual meetings in 2007. CAADP acknowledges the crucial role of the agricultural sector, both in terms of productivity and food security, to ensuring safety nets and accelerating broad-based economic growth.

The Ethiopian Compact maps Ministry of Agriculture and Rural Development (MoARD) and Government of Ethiopia (GOE) strategy against the four CAADP pillars: *land and water management, market access, food supply and hunger, and agricultural research*. A corollary to the Compact is the donor-led Policy and Investment Framework (PIF) to align the financing commitments of country donors against the Compact's plan. This document provides a framework for both innovation and capacity building, complementary to the CAADP Compact and MoARD's priorities reflected in the pillars.

**Agricultural Growth Program (AGP)** – the AGP includes the set of sectoral financing activities emergent from the joint MoARD and donor working group on Rural Economic Development and Food Security (RED-FS). The AGP targets 83 high potential woredas in *Oromia, Amhara, SNNPR, and Tigray*. The approach provides a bottom-up, decentralized planning to identify key interventions and projects at the kebele and woreda levels. Project proposals are submitted for review by woreda and regional officials in the respective Bureaus of Agriculture and Rural Development (BoARD) for financing. Substantial funding will be allocated for local project implementation geared toward a combination of technology adoption and behavior change to enhance productivity, and the commercialization of production surpluses with improved marketing and value addition.

AGP contains a combination of concessionary lending and direct aid, primarily from the World Bank, USAID, CIDA, and other bilateral partners, with some parallel funding from the Ethiopian government. The total budget allocation is shifting, and parallel resources will be made available to complement the initial lending commitments made by the World Bank, but the eventual total for a five-year disbursement (2010 to 2014), including numerous parallel programs, is expected to range from USD 200 to 500 million.

**Food Security Program (FSP)** – whereas the AGP targets high potential woredas, the Food Security Program (FSP) targets 273 woredas where chronic food insecurity, malnutrition, and vulnerability are highest. A joint program, financed by a combination of donor resources and GOE revenue, FSP will receive a second phase of funding for 2010 to 2014. USD 2.1 billion to USD 2.5 billion is anticipated in allocations over the five-year term, which is an increase of over 30 percent from the previous funding window. FSP has four components: *the Household Asset Building Program (HABP) for financial services, the Complementary Community Investment program for irrigation investments, the Productive Safety Net Program (PSNP) for food aid and cash transfers, and a resettlement program* in lowland areas to higher productivity ecologies.

The Productive Safety Net Program (PSNP) is the single largest component of the FSP and provides direct cash and food transfers to food insecure households. In contrast to the prior phases of safety net programs, PSNP will pilot conditional cash transfers directly to food insecure households in addition to direct food aid. The Complementary Community Investment program is primarily government financed and focuses on mid-scale irrigation projects, reaching up to 250,000 hectares. These irrigation investments are primarily linked to agricultural production, for both smallholder and commercial activities. Household Asset Building Program (HABP) focuses on the improved food sufficiency for households in food insecure areas through the diversification of income sources and increase of productive assets. The program innovates on earlier food security initiatives, addressing poor financial practices and lack of savings in rural areas, the inabilities of local administrators and extension workers to complete their daily

tasks, weak linkages between household investments and complementary services including inputs and animal health services, and poor market access for diversified production even in regions of food insecurity.

### **Agriculture and water**

In recent years, externally funded support has gone for the most part towards emergency relief and military operations rather than to long-term sustainable watershed management and development. Currently it is commonly recognized that the region needs sustainable development in water resources to improve the safety situation, to increase productivity in agriculture and other economic sectors and to enhance resilience against climate change.

Almost all major river basins and groundwater systems in Ethiopia are trans-boundary. Many water resources are interconnected. Being conditional for socio economic development in the region, the water resources are a potential source for trans-boundary cooperation but also for tensions and conflicts in the region. Sophisticated and well synchronized use and management of the water resources is for that reason not only essential for socio-economic development but also for security and stability. At the local level, several projects and programmes focusing on development and management of the water resources are under implementation, e.g. construction of large scale dams for hydropower and irrigation, and various land use planning, forest protection and other soil and water conservation activities, via NGO's, government agencies and multi-stakeholder structures like national safety net programmes, etc. However, these activities are not always placed in the context of river basins, sometimes disturbing the water balance in basins and/or leading to water pollution. A major constraint towards sustainable water management is the lack of a common vision on the development of water resources in the various basins of the region. Although general water policies at the national levels are more or less in place, and a development strategy has been formulated for a number of catchments, the actual action initiated on the ground to implement planned integrated water resources management (IWRM) activities is still limited. This is due to limitations such as poor availability and accessibility of data, poor communication between different governmental and non-governmental institutions, lack of capacity and poor enforcement of e.g. land use zoning and water allocation plans. However, the establishment of river basin authorities and several IWRM capacity building initiatives are gradually leading to a more conducive environment for IWRM. Human and institutional capacity is a key factor in the implementation of sustainable water management. Capacity problems are for instance inadequate management due to rather rigid centralized governance structures, lack of smooth cooperation between senior and junior water professionals and training modules not adequately responding to the changing skills requirements because the development of human resources is still largely supply-driven. Most water related curricula are purely technical.

### **Bilateral programme Ethiopia & Netherlands**

In its Multi-Annual Strategic Plan (MASP), the Embassy of the Kingdom of the Netherlands (EKN) has formulated the following main objectives for its operations over the next four years (2012-2015)<sup>1</sup>: *“In 2015 Ethiopia will be more food secure, experience more equitable and sustainable economic and social development and will be less vulnerable to disasters and conflict. Ethiopian society will function more inclusively, with increasingly applied principles of upward and downward accountability, participation and the rule of law” (see annex 1).*

The Netherlands' support to the development in Ethiopia will be aligned with the Growth and Transformation Plan (GTP) to the extent possible and will rest on the following three spearheads: i) Security and Rule of Law; ii) Food

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<sup>1</sup> As an example an important initiative started with the embassy is the “Small-Scale and Micro Irrigation Support Project (SSMISP)” in Ethiopia (for more background see on NWP [https://www.dropbox.com/sh/etycio3uydzbbxj/n\\_Ulh\\_rl6F](https://www.dropbox.com/sh/etycio3uydzbbxj/n_Ulh_rl6F))

Security; and iii) Sexual and Reproductive Health and Rights. Gender and nutrition will be mainstreamed in all strategies.

The main objective of Spearhead II: Food Security is formulated as follows: *“In 2015 Ethiopia will have achieved increased food security and agricultural growth within an improved business climate, and Ethiopians will have better access to more and more nutritious food”*.

This main objective is being operationalized through three sub-objectives:

- *Food insecure highlands*: reduce household vulnerability, improve resilience to shocks and promote community-based nutrition in food insecure areas of rural Ethiopia;
- *Surplus producing areas*: increase agricultural productivity and market access in surplus producing areas with increased participation of women and youth; and
- *Market integrated/semi-commercial*: increase the competitiveness and business climate for a number of agribusiness subsectors.

### Europe

The European SHARE programme 2 Supporting Horn of Africa Resilience (SHARE) initiative will help to boost food security in the lowland areas of Ethiopia through a series of long-term measures: for example, it will support a mechanism that provides cash and food to vulnerable people in case of a shock (e.g. during a drought) and will improve nutrition, for instance by promoting dietary diversification and the local production of vegetables, milk and forage.

The assistance will also strengthen animal health services and support livestock vaccination campaigns, as well as the management of natural resources such as water and grazing lands. The various activities will help families get more income and be better prepared to cope with any further droughts or shocks.

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<sup>2</sup> [http://europa.eu/rapid/press-release\\_IP-13-911\\_en.htm](http://europa.eu/rapid/press-release_IP-13-911_en.htm)

## 2 ASSESSMENT OF STATUS AND PROBLEMS OF INFORMATION SUPPLY IN THE AGRICULTURAL SECTOR

*For food (and water) security programs, actual and accurate (spatial) information is crucial for land and crop production systems to provide quick indicators on the context (e.g. water availability), status (e.g. biomass, crop type, acreage, etc.) and trends (within and in between seasons, years) of local farming practices/performance. In this section, the main challenges in information supply in Ethiopia are summarized as well as the institutional capacity to support viable information services.*

### 2.1 MAIN CHALLENGES IN INFORMATION SUPPLY ENCOUNTERED IN AGRICULTURAL ACTIVITIES

Ethiopia's agriculture sector is confronted by several broader challenges. Some of the major challenges are:

- Even though farmers are the most important stakeholders in the agricultural sector, currently information is not reaching the farmer at the right phase of the farming life cycle to make optimal decisions:
- Information services on short-term productivity and crisis management services, such as weather updates, are simply pushed out to the consumer with little customization or interaction. These services are readily available at no cost (often subsidized by the government).
- The second challenge is the payment for these information: while farmers appreciate these services, they often either do not have to pay because the service delivery is subsidized, making the service unviable, or are unwilling to pay because they are used to acquiring information for free, albeit from flawed and slower sources.
- Despite immense potential, agriculture water development, especially irrigation has not received sufficient investments. According to data from the Ministry of Water Resources (MoWR), the total potential irrigable land of the country is estimated to be 3.7 million hectares. Currently less than 5% of the total irrigable area is under irrigated agriculture.
- Ethiopia's agriculture is heavily dependent on seasonal rainfall. Food insecurity has resulted as both quantity and distribution of precipitation have not been adequate to sustain crop and livestock production. Due to recurring droughts rural communities are prevented from building up their assets in a long-term, sustainable manner.
- Sharp increases in the prices of food and fertilizers on world markets have repeatedly made it more difficult for poor households in Ethiopia to secure adequate food supplies. Further, there is an ineffective and inefficient agricultural marketing system.
- Inadequate infrastructure and localized technical information, as well as budgetary shortfalls are some of the major constraints that inhibit effective agricultural knowledge management and delivery of agricultural extension services in Ethiopia. Most Farmer Training Centers have no access to electricity and do not have electronic equipment. In addition, most of the development agents and extensions workers have limited ICT skills to optimally utilize them in their daily agricultural extension work with smallholder farmers.

### 2.2 INSTITUTIONAL CAPACITY TO SUPPORT VIABLE INFORMATION SERVICES

In general the main information supply in agriculture is managed by the government and in particular the Ministry of Agriculture and Rural Development. Important to mention is that all information flows are approved and controlled by the Ministry of Information. In the following sections more attention is given to the various information flow relevant to agricultural activities in Ethiopia by various stakeholders (programmes).

### 2.2.1 GENERAL INFORMATION SUPPLIERS ACTIVE IN AGRICULTURE DOMAIN

In Ethiopia there is no well established geo data infrastructure; as a result there is geo information problem among users and providers. Basic reasons for this goes to problems with institutional arrangements of geo information provider organizations. These organizations are governed by traditional management system, poorly structured internally and externally, and not effective in producing and providing of geo information for the society. The problems that affect effectiveness of functions of geo information organizations and then development of geo information are described below:

1. Outdated proclamation of the geo information organizations. The existing mission of the organizations is affecting the effectiveness of organizations functions and development of the geo information. According to the mission, they are budgeted, controlling production and distribution of geo information, sole producers and providers of geo information in the country, and product driven. Moreover, their ability in development of human resource and effectively using is very weak. Accomplishing their responsibilities and mandates is generally not possible and challenging. Institutional capacity in providing up to date and users demanding data is very limited.
2. Poor administration of geo information products; and weakness in dealing with geo information technology. These problems are manifested as:
  - There is no standard at the national level for geoinformation products. Organizations are collecting, processing and storing data in isolation and in a way compatibility of data from different sources is not insured;
  - There is a problem in accessing and sharing of data found within government organizations;
  - Geo information is not effectively used by the organizations and maintained regularly.

Similarly, pricing standards for geoinformation products is not developed at national level. Prices of geoinformation products vary from organizations to organizations; and some of geo information products are given free or with least price, despite literatures suggest geo information products have to appropriate price.

3. Absence of coordination among geo information organizations. the organizations are not coordinated to exchange information or develop geoinformation policy/; data pricing to promote data sharing, which, otherwise results in effort and resource duplication.
4. Absence of outsourcing geo information activities, those can not be done by the organizations. The organizations have huge responsibilities in providing geo information for the society. But they have human and technological capacity problems to do that. To mitigate problems, the organizations need to outsource those activities, however, it is not done largely. In addition outsourcing of activities promotes roles of private companies in data capturing, updating and distributing, to satisfy demand of users and help geo information development in the country.

### 2.2.2 SPECIFIC AGRI-SECTOR INFORMATION SUPPLY AND CURRENT MECHANISMS

Relevant Information supply is done by the yearly census of the National Bureau of Statistics. This census is done in cooperation with the agriculture extension office of the Ministry of Agriculture and Rural Development on various administrative levels.

Special attention should be given to the WOREDANET SATCOM network, which provide a national wide access to information exchange in various sectors. The agricultural sector is currently improving her information distribution through this network, which is quite a challenge and requires much training, procedures and awareness, etc.

Despite immense potential, agriculture water development, especially irrigation has not received sufficient investments. According to data from the Ministry of Water Resources (MoWR), the total potential irrigable land of the country is estimated to be 3.7 million hectares. Currently less than 5% of the total irrigable area is under irrigated agriculture.

Ethiopia's agriculture is heavily dependent on seasonal rainfall. Food insecurity has resulted as both quantity and distribution of precipitation have not been adequate to sustain crop and livestock production. Due to recurring droughts rural communities are prevented from building up their assets in a long-term, sustainable manner.

Sharp increases in the prices of food and fertilizers on world markets have repeatedly made it more difficult for poor households in Ethiopia to secure adequate food supplies. Further, there is an ineffective and inefficient agricultural marketing system.

Inadequate infrastructure and localized technical information, as well as budgetary shortfalls are some of the major constraints that inhibit effective agricultural knowledge management and delivery of agricultural extension services in Ethiopia. Most Farmer Training Centers have no access to electricity and do not have electronic equipments. In addition, most of the development agents and extensions workers have limited ICT skills to optimally utilize them in their daily agricultural extension work with smallholder farmers.

### 2.2.3 OTHER SECTORS (AND ROLE OF INFORMATION) IMPORTANT FOR THE AGRICULTURAL SECTOR

Topographical, meteorological & cadastral data are mostly directly or indirectly governed by the Ministry of Defense or related institutions. The combination with agricultural information is therefore limited and is certainly not an open data process.

### 3 NEEDS ASSESSMENT OF IMPROVED ICT & INFORMATION SUPPLY IN THE AGRI SECTOR

*In this section, an inventory of specific needs and problems in the information supply (and demand) in the Ethiopian agri sector is provided. The most important local stakeholders represented in the identified problem domains are selected (short list). Furthermore, additional stakeholders in related domains need to be selected (e.g. water domain, nature, industry, etc.).*

#### 3.1 NEEDS ASSESSMENT WITH A FOCUS ON POTENTIAL USE OF SPATIALLY BASED INFORMATION SERVICES

The main needs are:

- Need for a structural and timely (and 100%) meteorological data sensor network on the ground, which will be assembled on various scales from community (Quebilla) to regional (Woreda) to national level (beneficiary entities are METOFFICE or National Meteorological Authority NMA);
- Need for local solutions on agricultural crop management in anticipation of season (water availability analysis, feasibility of growing season) and during the season in terms of inputs and decisions on timing (sowing);
- Overview of Pastoral information needs on extended regions for grazing and planning.

#### 3.2 PUBLIC AND PRIVATE PROBLEM STAKEHOLDERS AND INTERNATIONAL ORGANIZATIONS IN THE DOMAIN OF G4AW

The main stakeholders are listed below:

- Ministry of Information is an important stakeholder for allowing and commitment to new information strategies in the Ethiopian context in general
- Ministry of Agriculture and Rural Development (MoARD)
- Ministry of Water
- WFP has many programmes in the agricultural context
- Yearly Agricultural census (ministry of Statistics) programmes

#### 3.3 ON-GOING G4AW RELEVANT ACTIVITIES AND/OR PROJECTS IN ETHIOPIA

The main on-going relevant activities with use of spatial information (from satellites):

- Food security Projects WFP , LEAP project with Min of Agriculture and Rural Development;
- WOREDANET: The existing WOREDANET project in Ethiopia is an unique well advanced satcom based information distribution network used for connecting communities all over Ethiopia. Education and distant learning programmes in community centers give opportunities of (broadband) broadcasting and information exchange even on the (Quebilla) Community level. At this moment SCHOOLnet uses this network for education at about 900 woreda<sup>3</sup> (or administrative regions). The peasant associations (peasant association and rural office or so-called BoARD) are organized at one scale level lower at community or Quebilla level under each woreda;
- Early warning (FEWSNET, US) to warn for droughts in conjunction with MoARD.
- WFP disaster risks (LEAP) in agricultural (droughts) in conjunction with MoARD.
- FAO (CFSAM) field missions to address/assess agricultural problems.

<sup>3</sup> <http://www.ethiopian-this-week.com/2013/04/over-950-woredas-offices-benefit-from.html>

- EU- DG-JRC MARS Bulletins on conditions.
- ESA-GMFS (VITO): is not currently active, but the experiences and lessons learned are useful.

### 3.4 REFERENCES TO PUBLIC DOMAIN PUBLICATIONS

See Data inventory sheets (86 pages) Horn Of Africa Study (Meta Meta, Acacia, Hoefsloot, Geocycli) or also [www.bufferthehorn.org](http://www.bufferthehorn.org)

A number of articles have been published to describe the use of weather insurance in developing countries. A very readable overview has been written by Erin Bryla and Joanna Syroka (2007) and can be found here: <http://www.un.org/esa/sustdev/publications/innovationbriefs/no2.pdf>

WFP programme LEAP for Ethiopia (Livelihoods, Early Assessment and Protection: <http://www.wfp.org/disaster-risk-reduction/leap>



## 4 INVENTORY OF POTENTIAL (CHAIN) SOLUTIONS DIRECTIONS USING GEO-ICT IN LOCAL AGRICULTURE ISSUES

### 4.1 BASE SOLUTION DIRECTIONS IN ETHIOPIA TAILORED TO LOCAL AGRICULTURAL PRACTICES

#### 4.1.1 ACTUAL AGRI-SPATIAL INFORMATION SERVICES

The current management of Ethiopian small farm holders is mainly based on intuitive actions and tradition and not often based on factual information. Farmers invest in inputs like seeds, manure and pesticides or plan their growing season at moments which appeared retrospective disastrously timed. Water availability is the keyword and seems obvious enough, but is not well balanced in the decision moments of farmers

With simple means a huge step can be made applying simple spatio-temporal analysis on actual weather data compared to historical data on local/regional scale turning into relevant and life-saving management information. Especially in remote areas where people depend on local economic markets and need to act with self-sufficiency at small scales.

The extension services residing under the Ministry of Agricultural and Rural Development (MoARD) are the most relevant to mention here, but need better overview and timely information to solve the above structural problems.

WOREDANET is an excellent base communication network not yet fully benefitted for (spatial based) food security information procedures important for farmer communities.

The combined use of future remote sensing based information services improves functionality of this network but especially helps in improving important information assessment (in space and time) for existing food security and early warning procedures and on the long run improvement of management and farmer practices of smallholder farmer groups (peasant associations).

In the sedentary or nomad (pastoral/agri-)culture accurate and actual information and overview of potential grazing area is of utmost importance to help in sound decision making of the local movements of communities and tribes. It might also play a role in prevention of conflicts and competition between the various local populations.

#### 4.1.2 FARM INSURANCE AND RISK PREVENTION STRATEGIES

The DMFSS department (Disaster Management for Food Security Services) at the Ministry of Agriculture and Rural Development is currently responsible for the Early Warning for food security procedures in Ethiopia. Various projects have been undertaken by the MoARD with WFP and e.g. the Dutch company Hoefsloot Solutions in order to develop information strategies for drought risk and early warning mechanisms in agricultural regions of Ethiopia. Remote sensing information play a prominent role in these (often weather based index risk information) strategies and need to be tailored in each agricultural region.

## 4.2 DIFFERENTIATION OF SPATIAL SOLUTIONS TAILORED TO AGRICULTURAL PRACTICES/SECTOR IN ETHIOPIA

Remote sensing can help on different scales. On the national and regional (provincial) scale the European commission (DG-JRC, MARS 4 Africa) have been frequently releasing a bulletin on agricultural developments for Ethiopia based (using SPOT VGT) on Vegetation Indices and ECMWF Global Meteorological Modelling (see annex 2). The FAO is using this as input for supporting the field missions (CFSAM) in Ethiopia. The Dutch company EARS has been active in supporting FAO as well in Ethiopia in producing time-series and bulletins on evapotranspiration and with that analysis on drought and growth conditions. Main relevant parameters to be produced on crops such as Sorghum, Teff, Maize, wheat, barley, Pastoral areas:

- Rainfall
- Biomass
- Vegetation condition
- Etc.

Besides within season also between the seasons and the years, give indications on deviations from the trends in the various agricultural regions of Ethiopia.

A short summary of potential remote sensing based applications is listed and discussed below:

- Land evaluation using soil, vegetation derived information from satellites
- Land use classification using satellite
- Distinction of rain fed & irrigated area using remote sensing is relevant in order to prioritize help
- Weather figures (rain, global radiation, evaporation, etc.) using weather satellites
- Water productivity assessment using thermal and optical remote sensing on various scales
- Water accounting modeling using the above as input, besides actual field information from traditional networks
- Spatial Planning using the above actual maps
- Etc.

## 5 PARTNERSHIPS BETWEEN STAKEHOLDERS IN ETHIOPIA AND THE DUTCH SECTOR

### Governmental Organizations

In Ethiopia there are many governmental organizations that actively involved in the production, dissemination and provision of digital data at national as well as regional levels. The importance and awareness of Geo-information in all institution is increased from time to time based on the capacity of GIS technology to handle a lot of information by using various software. It is the basic tools for planning and decision making for all levels of governmental hierarchy. All governmental organization of Ethiopia is established by governmental proclamation to satisfy the need of geo-information in the country. The proclamation consists of the legal mandate and obligations of the organization like mission, power and duties, and right of ownership. It is to difficulty to get all spatial information from one sectors or institution, as a result different governmental organization are participated in producing spatial data. The main responsible national organizations that are currently involved in geodata information production and dissemination are shown in table 1.

Organization	Responsibility	Main products
Ethiopian Mapping Agency	Preparing foundation data	Topographic and aerial photography maps, surveying products, orthophoto products, National Atlas, RS and GIS research products
Geological Survey of Ethiopia	Producing geological and other related products	Geological, hydrological, geophysical and mineral maps, earth sciences scientific reports
Ministry of Water Resource	Preparing master plan information for river basins and water policy	River basin master plan maps and digital maps, river basin studies report
National Urban Planning Institute	Preparing master plan and related information for urban areas	Urban areas master plan maps
Environmental Protection Authority	Monitor environmental condition and preparing environmental information	Environmental policy and assessment guide lines and strategy.
National Meteorological service Agency	Producing weather and climate information	Meteorological data (daily, monthly, seasonally weather & climate bulletins).
Population and Housing census commission office	Producing population data	Statistical information about population number, distribution etc at different administration levels in the country
Ministry of Agriculture	Preparing land use maps and policy for the country	Land use policy, land use maps
Ethiopian Science and Technology commission	Coordinating and promoting science and technology in the country	National and sectoral science and technology policies
Ethiopian-Tourism Commission	Preparing tourism information	Information on tourist areas, promoting eco-tourism

TABLE 1.1 : ORGANIZATIONAL RESPONSIBILITY AND MAIN PRODUCTS OF VARIOUS ETHIOPIAN INSTITUTIONS

In addition to the above mentioned organizations the Ethiopian Road Authority and from the higher institution, Addis Ababa and Adama University are active in providing and using geo data. The Ethiopian Mapping Agency, Central Statistics Agency, Ministry of Water Resources, and other institutions produced digital data by digitizing paper and analog maps, by collecting ground data using GPS, and by other methods especially by collecting satellite remote sensing imageries from international data providing institutions.

The Ethiopian Mapping Agency (EMA) is the government organization with the responsibility for mapping, surveying and remote sensing activities in Ethiopia is the pioneer in production of thematic map and topographic maps starting from its establishment as an autonomous agency of the government of Ethiopia in 1980. The Environment Protection Agency (EPA) uses information from different governmental institutions to produce environmental reports. The EPA identified key institution that provides necessary information. EPA established Ethio-EIN is an Ethiopian

Environmental Information Node in 2004 as part of the African-EIN and will contribute greatly forwarding the concepts of Land Information System and GDI Marquardt and Bekure.

According to the Ethio-EIN 2009, the major institution that provide information to central environment management are Central Statistical Authority, Christian Relief Development and Aid , Disaster Prevention and Preparedness Commission , Ethiopian Mapping Authority , Geological Surveys of Ethiopia , Institute of Biodiversity Conservation ,Ministry of Agriculture and Rural Development, Ministry of Health, Ministry of Water Resources, National Meteorological Services Agency and Population and Housing Census Commissions office, Ethiopian Science and Technology Commissions, Amhara Regional State, Gambella Regional State, Oromia Regional State, Southern Nations and Nationalities Peoples Regional State , and Tigray Regional State. All these institutions have professionals in their specialty area to carry out data collection, analysis, interpretation and technical write-up.

The Ethio-EIN has their own framework structures which are actively working together in order to facilitate the development of Environmental information within the country. The framework have a national steering committee, a national coordinating unit, a forum for stakeholders, a technical support service, a national technical committee, environmental information working groups, and stakeholders' data centers.

#### **Non- Governmental Organizations**

Beside the national governments, different International and national NGOs are struggling to develop the geo data information infrastructures. For instance,

**The EthioGIS Project** is one of the substantial contributors to the development of the geo data information infrastructures with the major goal to reduce duplication of effort among agencies and institutions, to improve quality of the data and to make more accessible to the community. The Geospatial information System Ethiopia developed at the Centre for Development and Environment (CDE), University of Bern brings in to focus all relevant spatial data like terrain, soil, land cover and use, climate, drainage, infrastructures, population and agriculture in a Geographic Information System (GIS) as the basis for decision making and planning of resource management strategies.

**The Ethiopian Natural Resources and Environmental Meta-Database (ENRAMED)** is also another project which is originated from the environmental support project which is administered under Dutch- Ethiopian bi-lateral development. The Ethiopian Natural Resources and Environmental Meta-Database (ENRAMED) and the National GDI are the two formal networking initiatives in Ethiopia. The Environmental Metadata base have the following datasets which were collected by the partner institutes: socio-economic, hydrological, topographic and thematic maps, aerial photographs, satellite imagery, meteorological, agricultural, natural resources, demographic, geo-science data, passport and others

The ENRAMED Metadata software has been in use starting from 2003 onwards. Because of the high importance of ENRAMED software (upgrading and providing new IT infrastructure), the Ministry of Water Resources and other international organizations like UNEP, UNECA, and UN-Water/ Africa underlined the need for upgrading of ENRAMED and to make it bug- free and ISO Standard compliant (ADB,2006). It is considered as the heart of the Ethiopian national information and knowledge management system in sharing water data and information among different national stakeholders with in the country and abroad.

**Geographic Information Science Society of Ethiopia (GISSE)** was established in October 2007 as non-profit professional organization composed of geospatial professionals from the public, private and academic sectors operating in the country. The main objective of GISSE is to support the setting up of national level GIS Infrastructure, standardization of the spatial data and provide professional assistance through establishing a network of GIS

professionals in Ethiopia. The society currently performs its works in its office at Addis Ababa University (AAU), Science Faculty of Earth Sciences Department. The society organizes NSDI workshops, seminars and awareness creation among the stakeholders of the NSDI. Based on their contribution the establishment of GISSE in 2007 is considered as one of the major ENSDI milestones.

Further other foreign donors like UNECA, Swiss Agency for Development and Cooperation (SDC), the Global Spatial Data Infrastructure (GSDI), Global Mountain Program (GMP) and Eastern and Southern Africa Partnership Programme are the major ones that has been strongly promoting the development of the geo data nformation through capacity building and providing workshop and seminars both at regional and national levels.

Public-Private Partnerships are to be constructed in the workshop and mission in 2014 addressing the above issues by combining efforts with the government of Ethiopia to start with and the following types of national organizations (see stakeholders list for specific Ethiopian entities):

Important financial stakeholders with sustainable business interests in target country (Either local investors, insurance, banking, big agri-partners, etc.

**Solution stakeholders** like agri partners, ICT partners in target country, agri-, ICT-service (water) parties, Knowledge partners in NL (Sector), Water partners with important relation to Agriculture sector (target country and NL).

## ANNEX 1 MULTI-ANNUAL STRATEGIC PLAN (MASP)

In its Multi-Annual Strategic Plan (MASP), the Embassy of the Kingdom of the Netherlands (EKN) has formulated the following main objectives for its operations over the next four years (2012-2015): *“In 2015 Ethiopia will be more food secure, experience more equitable and sustainable economic and social development and will be less vulnerable to disasters and conflict. Ethiopian society will function more inclusively, with increasingly applied principles of upward and downward accountability, participation and the rule of law”.*

The Netherlands’ support to the development in Ethiopia will be aligned with the Growth and Transformation Plan (GTP) to the extent possible and will rest on the following three spearheads: i) Security and Rule of Law; ii) Food Security; and iii) Sexual and Reproductive Health and Rights. Gender and nutrition will be mainstreamed in all strategies.

### *Spearhead II: Food Security*

The main objective of Spearhead II: Food Security is formulated as follows: *“In 2015 Ethiopia will have achieved increased food security and agricultural growth within an improved business climate, and Ethiopians will have better access to more and more nutritious food”.*

This main objective is being operationalized through three sub-objectives:

- *Food insecure highlands:* reduce household vulnerability, improve resilience to shocks and promote community-based nutrition in food insecure areas of rural Ethiopia;
- *Surplus producing areas:* increase agricultural productivity and market access in surplus producing areas with increased participation of women and youth; and
- *Market integrated/semi-commercial:* increase the competitiveness and business climate for a number of agribusiness subsectors.

### **Ethiopian agricultural sector**

The Ethiopian economy has registered rapid growth rates averaging 11% per annum over the past decade, placing the country among the top performing economies in Sub-Saharan Africa. The new 5-year Growth and Transformation Plan (GTP) envisages continuing growth of the Gross Domestic Product (GDP) at a minimum 10% per year.

Up to 12 million Ethiopians depend on food aid in any given year, a few million permanently and 7,2 million on food or cash for work under the Productive Safety Net Project (PSNP). It has been accepted that the overall food security situation has reasonably improved over the past two decades. The diet of many families is strongly cereal based with too little attention for iron, iodine, vitamin A and zinc.

Agriculture is the leading sector of Ethiopia's economy as the overall economic growth of the country largely depends on the agricultural sector. The sector provides employment to 83% of the population, contributed 41.6% to the country's GDP in 2009/10 fiscal year, and 85% of its export earnings. Food security nonetheless remains a key challenge. Over the past two decades, the Government of Ethiopia and its development partners have sought to meet this challenge through investments that directly target a relatively large and chronically food-insecure population. While such a strategy is expected to strengthen the livelihoods of food-insecure households, long-term food security cannot be achieved through exclusive attention to the vulnerable. Success will require complementary efforts to enhance agricultural growth, and thereby reduce food prices and diversify rural livelihoods.

The agriculture sector largely depends on rainfed production and is dominated by smallholder farming systems with about 11.7 million households having access to less than 1 ha of arable land. Most agricultural production is used to meet household consumption needs and a significant number of households experiences food shortages during the pre-harvest period. In case that smallholder farmers have surpluses, they have problems with the marketing of their agricultural produce due to lack of access to markets, marketing information and high transport costs.

In all farming systems, livestock is the single most important household asset and there is a strong correlation between lack of livestock ownership and poverty, particularly among female-headed households. Livestock production accounts for about 32% of agricultural GDP and draught animal power is critical for all farming systems.

The cultivation of cereals dominate Ethiopian agriculture as it accounts for about 70% of agricultural GDP. Over the past decade, cereal production has more than doubled to nearly 15 million tonnes as a result of horizontal expansion and increased yields. Nevertheless, food security remains a critical issue for many households and for the country as a whole. Moreover, expansion of the cropped area to more marginal lands has resulted in severe land degradation in some areas.

Ethiopian agriculture is dominated by a low input-low output, rainfed farming system. Even though the data suggest that crop yields of around 1.5 tonnes per ha for staple crops (i.e. maize, teff, wheat) in Ethiopia surpass the average for East Africa, they are still lower than potential as shown in research replicating conditions in farmers' fields. Low use of farm inputs, such as quality seed of improved varieties, organic and chemical fertiliser and mechanised ploughing are the most important physical constraints. In terms of seed more than 90% of the seed farmers use is farm saved seed.

Although the application of fertiliser in Ethiopia has increased in recent years, Ethiopia is still one of the lowest users of artificial fertiliser in Africa with around 40 kg per ha. In addition, the fertiliser used is often not applied at the right rate, at the right time, and the right quality (composition). Nitrogen and phosphate fertilisers are applied to only around 45% of arable land. Hardly any other chemical fertiliser, such as potassium, micro-nutrients or lime, is applied.

Low agricultural productivity can also be attributed to limited access by smallholder farmers to agro-chemicals, financial services, improved production technologies, irrigation and agricultural markets as well as to poor land management practices that have led to severe land degradation. Ethiopia has one of the highest rates of soil nutrient depletion in Sub-Saharan Africa. Estimates suggest that the annual phosphorus and nitrogen loss nationwide from the use of dung for fuel is equivalent to the total amount of commercial fertiliser applied. Land degradation is further exacerbated by overgrazing, deforestation, population pressure and inadequate of land use planning.

In addition, post-harvest losses are seriously decreasing potential household consumption and overall marketable surplus. Available data suggest annual losses of 15 to 20% of potential grain production due to poor pre-harvest practices and natural disasters, whereas post-harvest losses of up to 30% are reported due to inappropriate collection, transport, storage and pest control. Post-harvest losses for non-grain commodities are also high.

The extension system in Ethiopia consists of 60.000 development agents (DAs), who are working at kebele level. In principle, each kebele should have three DAs in the following fields: crop production, livestock and natural resource management (NRM). In addition, around 8.500 Farmer Training Centres (FTCs) have been developed. According to some sources, the extension programme contributed significantly to the overall productivity increases. Although the extension system has the potential to boost agricultural productivity, it is seriously under-resourced and under-capacitated to live up to its tasks. The main challenges comprise: top-down package approach not tailored to specific farmer needs; male bias often excluding female farmers; absence of linkages with research and development

institutes and strong focus on technical skills rather than soft skills, including market orientation. Similar challenges are persistent in the research and education system, where there is a strong emphasis on technical, mono-disciplinary fixes and package and manual approaches rather than joint (participatory), integrated problem solving. Overall, the improvement of the agricultural knowledge and innovation system towards a more flexible, diverse, market orientation, gender sensitive and better coordinated system is seen as key driver for increasing frontline productivity (EKN 2011).

Despite recent positive developments in smallholder agriculture, recurrent drought is a common phenomenon, which has compelled the country to depend on foreign food aid. The agricultural sector faces several challenges to produce adequate food supply for domestic consumption and export earnings. Greater investment in high-potential areas is required to maintain growth. Given that research indicates that much higher yields can be achieved when different types of chemical fertilizer are used with improved seed, irrigation and pesticides, it is reasonable to assume that the potential for Ethiopian agriculture remains large. With a total area of about 1.13 million km<sup>2</sup> and about 51.3 million ha of arable land, Ethiopia has tremendous potential for agricultural development. At present, only about 11.7 million ha of land are currently being cultivated, which is just over 20% of the total arable area.

The agriculture sector has promising opportunities to transform itself from subsistence to a level of modern and commercial sector. Substantial opportunities exist to add value to agricultural produce on and off the farm. Efforts to take advantage of these opportunities will create employment along the agricultural value chain. The demand and supply linkages generated by adding value to agricultural produce would provide alternative sources of incomes for many rural households and reduce vulnerability. Reliable production of increased quantity and quality of raw materials will stimulate private investment in agro-processing. Strengthening the institutions to support agriculture and enhancing the skills and knowledge of male and female farmers will yield significant returns. Efforts to reverse environmental degradation, including the loss of soil nutrients and sources of water, could substantially raise agricultural productivity.

#### *Main challenges to the development of high-yielding smallholder agriculture*

- High vulnerability to weather-induced shocks;
- Farmers' low skills, knowledge and education;
- Underdeveloped land, labor and credit markets;
- Environmental degradation;
- Limited opportunities and access to resources for women and youth; and
- Disproportionate attention in recent years to areas of low agricultural potential, with corresponding relative neglect of those with high potential.

#### **Policy Framework for Agricultural Sector**

The Ethiopian government has a strong commitment to continued agricultural growth. In recent years, between 13 and 17% of all government expenditure has been channeled towards agriculture. While almost half of this expenditure supports chronically food insecure households, investments are also directed towards expanding the extension system or large-scale infrastructure to foster continued growth in agriculture and agro-processing. The government is complementing its efforts in food insecure areas with an increased commitment to raise national food production by investing in areas with high agricultural potential. (World Bank 2010)

Since 1991, the Government has been implementing its strategy of Agricultural Development-Led Industrialization (ADLI) that sees agriculture as the engine of growth. Its main thrust has been to: (i) improve agricultural extension



services; (ii) promote better use of land and water resources; (iii) enhance access to financial services; (iv) improve access to domestic and export markets; and (v) provide rural infrastructure.

The Plan for Accelerated and Sustained Development to End Poverty (PASDEP) was implemented from 2005/06 to 2009/10 and it aimed to: (i) improve implementation capacity; (ii) promote accelerated and sustained economic growth; (iii) manage population growth; (iv) empower women; (v) strengthen infrastructure; (vi) develop human resources; (vii) manage risk and volatility; and (viii) create employment opportunities.

In the agricultural sector, PASDEP called for: (i) market-based agricultural development; (ii) increased private sector investment; (iii) specialized support services for differentiated agro-ecological zones; (iv) improved rural-urban linkages; and (v) special efforts to support pastoral development. These objectives were underpinned by investments to improve rural infrastructure, enhance access to financial services, promote irrigation development, ensure land tenure security, and improve the performance of agricultural markets. PASDEP also recognized the urgent need to better manage the natural resource base and protect the environment.

The goal of the Agricultural Sector Policy and Investment Framework (PIF) 2010-2020 is to “*contribute to Ethiopia’s achievement of middle income status by 2020*”, whereas its development objective aims to “*sustainably increase rural incomes and national food security*”. This objective embodies the concepts of producing more, selling more, nurturing the environment, eliminating hunger and protecting the vulnerable against shocks. PIF has the following main themes, each with its own Strategic Objective (SO):

Productivity and Production	SO1: To achieve a sustainable increase in agricultural productivity and production.
Rural Commercialization	SO2: To accelerate agricultural commercialization and agro-industrial development.
Natural Resource Management	SO3: To reduce degradation and improve productivity of natural resources.
Disaster Risk Management and Food Security	SO4: To achieve universal food security and protect vulnerable households from natural disasters.

SO1 is expected to achieve a sustainable increase in agricultural productivity and production over the ten-year life of the PIF. This reflects the Government’s first priority for the agricultural sector, which is to increase productivity and production as a prerequisite for food security and agricultural-led industrialization. Increases in production are also expected from investments to improve the utilization of land and water resources. Irrigation development is a high priority for boosting agricultural production. In view of the capital intensive nature of irrigation development, with investment costs typically in the range of USD 5,000 to USD 20,000 per hectare, irrigation is likely to account for the largest share of investments under the PIF.

SO2 will build on the achievements of SO1 by helping farmers to graduate from subsistence farming to semi-subsistence/semi-commercial status, practicing farming as a business. SO3 will spearhead efforts to conserve and utilize Ethiopia’s natural resources in a sustainable and productive manner. It will reinforce the productivity and production initiatives under SO1 by ensuring that opportunities to adopt sustainable land and water management systems are grasped and threats to sustainable use of natural resources are averted.

### **Growth and Transformation Plan 2010-2015**

GTP sets ambitious goals for the five year period 2010-2015 (EFY 2003-2007) and the most prominent in terms of food security are as follows:

- Maintain at least an average real GDP growth rate of 11% and meet the MDGs, so that no food aid would be necessary anymore by 2015.
- Double agricultural production and triple agricultural exports by 2015.
- The existing strategy of ADLI will be continued, meaning that agriculture will remain the engine for growth complemented by investments in manufacturing and services.
- The agricultural strategy emphasizes support to intensification and commercialization of agriculture both for domestic and export markets by small and large farmers.
- There is a special focus on 'high-potential' areas, facilitating the commercialization of smallholder agriculture as the commercialization of smallholder farming will continue to be the major source of agricultural growth.
- To promote multiple cropping in order to cope better with climate variability and to ensure food security, the GTP will enhance the use of the country's water resources, whereby the expansion of small-scale irrigation will be given priority while due attention will be given to medium and large scale irrigation where possible.

The GTP gives strong emphasis to irrigation development and improving water use efficiency in order to improve production and productivity level of irrigated agriculture on a sustainable basis, so that the irrigation sector would contribute to the growth of the agriculture sector. In the coming years, the Ethiopian government plans a huge scale up of irrigable land from around 600.000 hectares currently to 1.8 million hectares in 2015. It is argued that in the short-term the development of small-scale irrigation is best positioned for this objective given the limited technical and organizational capacity to implement large-scale irrigation works.

#### **Agricultural Growth Programme**

The development objective of AGP is *"to increase agricultural productivity and market access for key crop and livestock products in targeted woredas with increased participation of women and youth"*.

The AGP will follow a decentralized, integrated approach and focus on selected clusters of woredas, which are areas that are relatively rain- and food-secure and, given the right support, hold considerable potential for agricultural growth. A total of 83 woredas in 20 clusters in the four regions of Amhara, Oromiya, SNNPR and Tigray have been selected based on following selection criteria: i) access to markets; ii) favourable rainfall (700mm and more); iii) suitable soil types; iv) potential for SSI; v) institutional capacity of governmental and non-governmental service providers, including cooperatives and farmers groups; and vi) willingness and commitment among all stakeholders to participate. The location of the 83 woredas is shown in the following map:

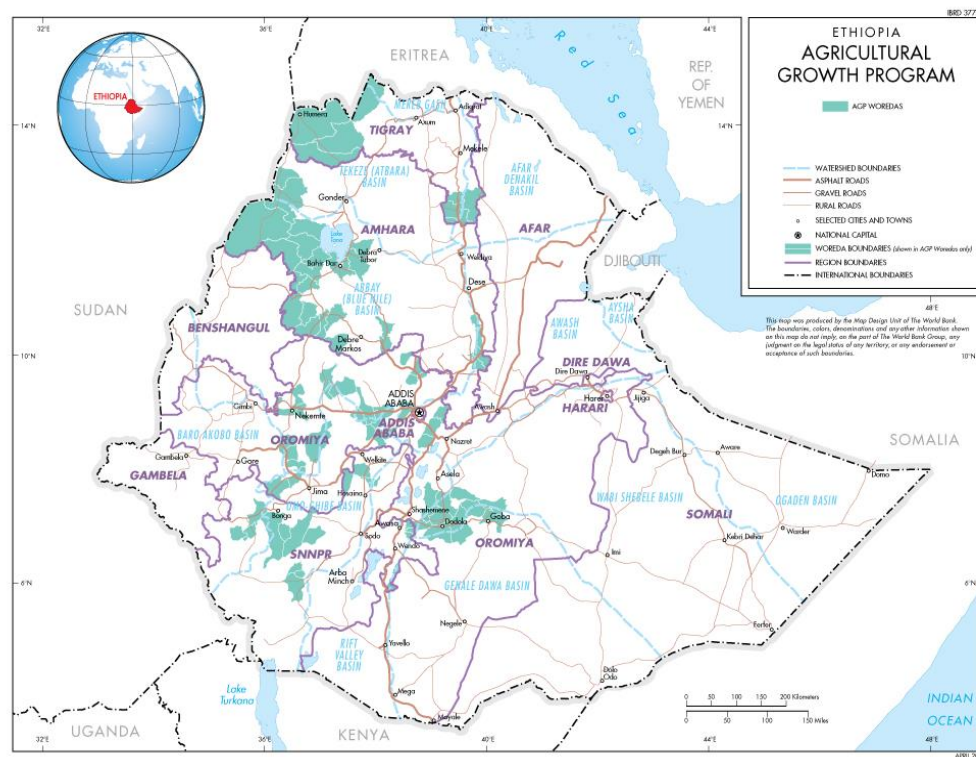


FIGURE 1.1 : AGRICULTURAL GROWTH PROGRAM

The AGP approach to agricultural growth is as follows:

- Focus on small- and medium-scale farmers in selected woredas in high potential areas, who crop an average area of somewhat less than 1 hectare.
- Scaling up best practices in agricultural production and post-harvest value addition.
- Strengthening of the ability of both public and private organizations to cooperate with each other to respond to smallholders' demands for new technologies, advice on improved practices, and investment in infrastructure.
- Investments in rural infrastructure will support SSI, watershed management (including water harvesting and micro irrigation), rural road development, and market infrastructure by adopting a demand-driven and market-oriented approach and based on bottom-up planning by local communities or farmer groups.
- Strengthening of informal and formal farmer organizations, including common interest groups (CIGs) formed by women and youth, as well as their cooperatives.
- Advisory service institutions will be strengthened to integrate farmers' organizations with value chains for selected commodities and enhance the effectiveness of the extension services.
- Cooperation with a range of public and private players, including public service providers, cooperatives, agro-processors, traders, and financial institutions.
- Special attention will be devoted to building knowledge on gender and youth issues by developing the capacity among women and youths to form producer groups, teaching leadership skills (particularly for productive organizations), and stimulating them to voice their views in meetings.

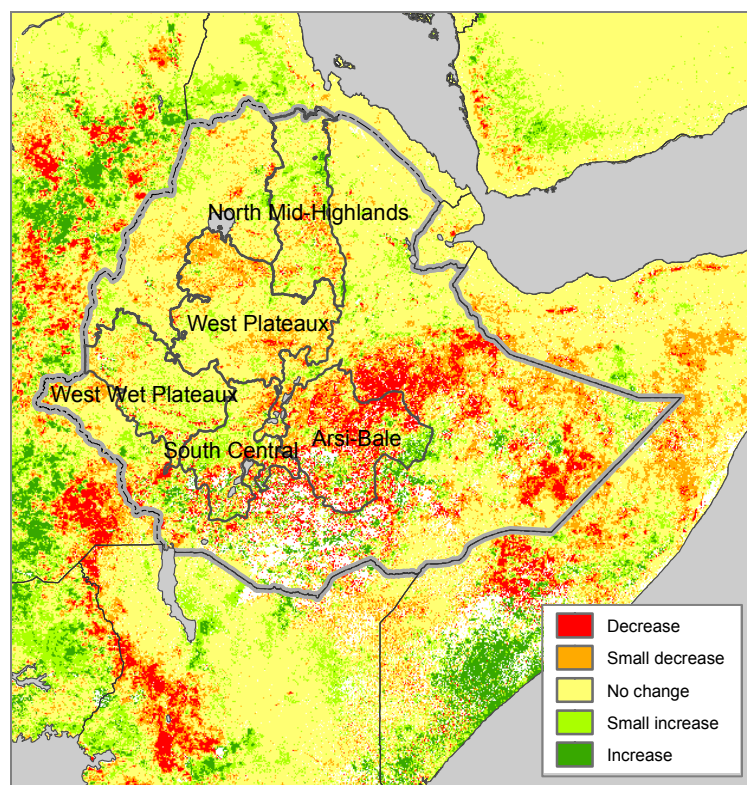
## ANNEX 2 MONITORING CROPLAND VEGETATION IN ETHIOPIA

## Overall rainfall and crop vegetation condition

### Highlights

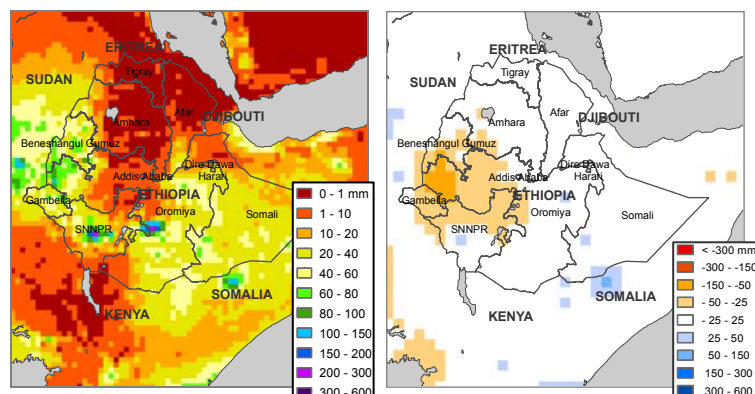
**Rainfall.** The North Mid-Highlands area has ended the season with a cumulative rainfall profile below last year and below the average historical profiles. West Plateaux and Arsi-Bale regions have profiles slightly below last year, South central is below last year but similar to 7 years average profile. The West Wet Plateaux is always above last year and above the averages. On the difference map, rainfall is again below normal in the eastern Oromiya region, and in northern SNNP region. Low levels of rainfall are now observed in the northern part of the country.

**Vegetation.** The map of the difference in the vegetation index between the 2<sup>nd</sup> dekad of October 2006 and the same period of 2005, shows globally normal vegetation conditions in the country but a decrease of vegetation conditions compared to last year, in the Eastern Oromiya.

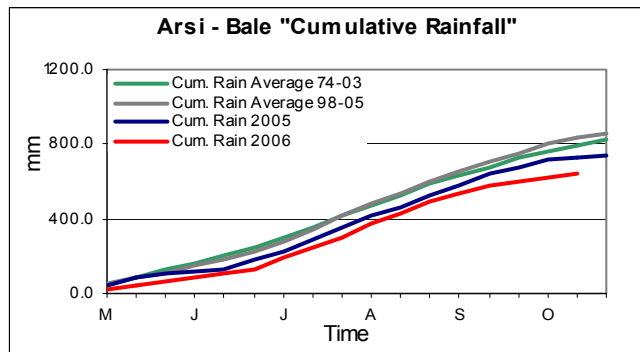
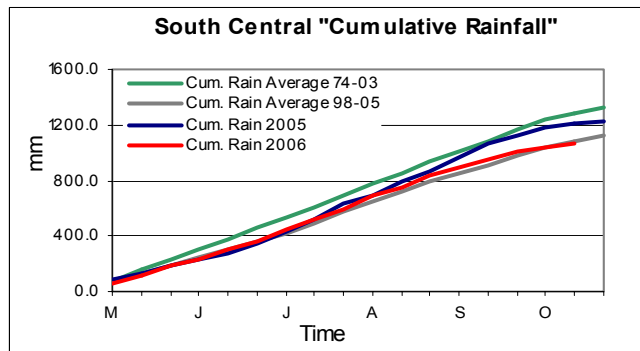
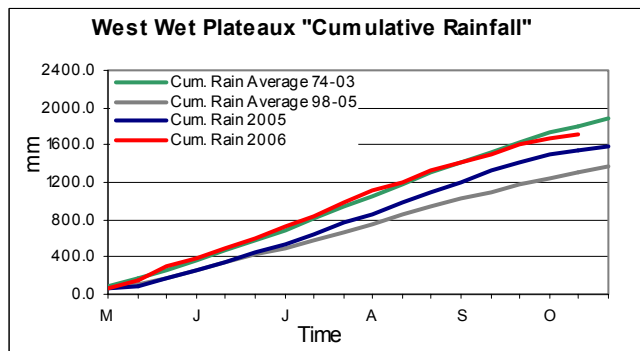
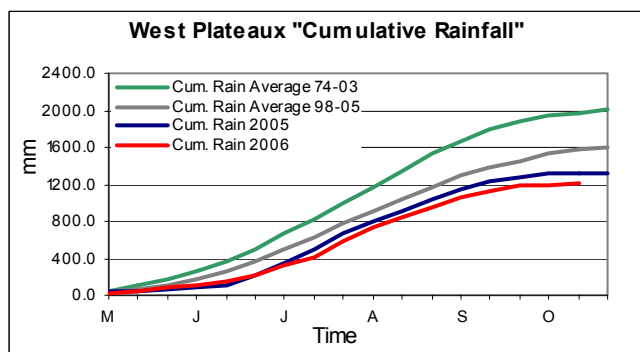
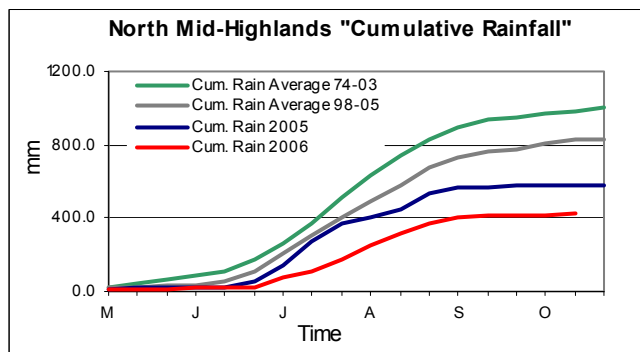


### Normalized Difference Vegetation Index (NDVI)

Absolute difference w.r.t. previous year (Act.-Prev.) – 2<sup>nd</sup> Dekad Oct 2006  
Data derived from SPOT VEGETATION Satellite



(left) 10 days Cumulated rainfall  
(right) 10 days Cumulated rainfall difference with normal (1974 – 2003)  
2<sup>nd</sup> Dekad Oct 2006 - Original ECMWF & ERA 40 data processed in-house.



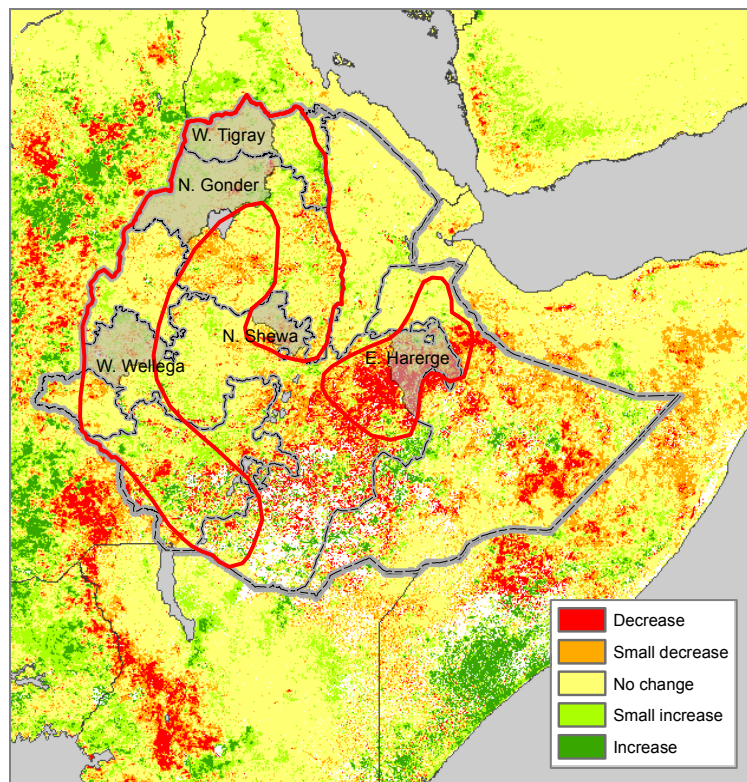


## Sorghum



### Highlights

The NDVI map shows globally normal vegetation conditions in the main sorghum production areas with clear patches of vegetation decrease in the East. The NDVI profiles of the Sorghum areas in all the zones are close to normal and to last year conditions. North Shewa and North Gondar rainfalls are below normal, while in the other zones, the rainfall conditions are all similar to normal (average of last 7 years) for the current dekad.






**Location of the Sorghum monitoring areas (gray)**  
**Location of the main Sorghum production areas (red outline)**

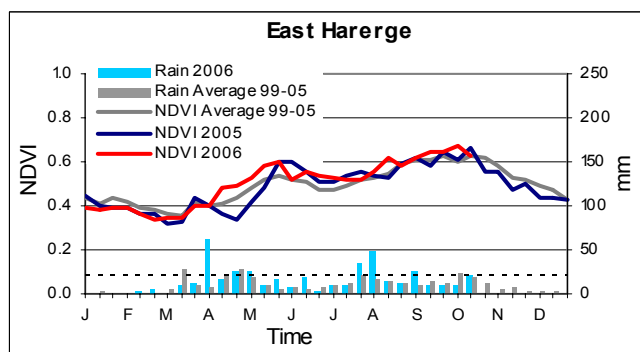
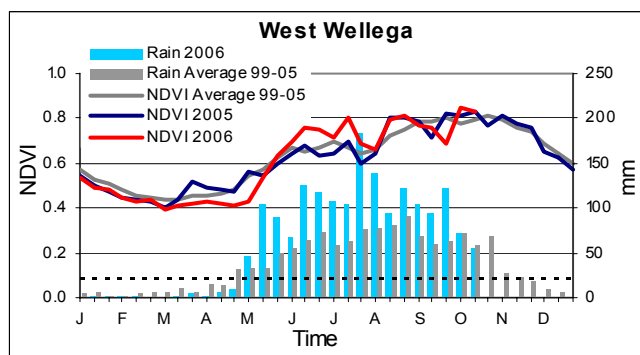
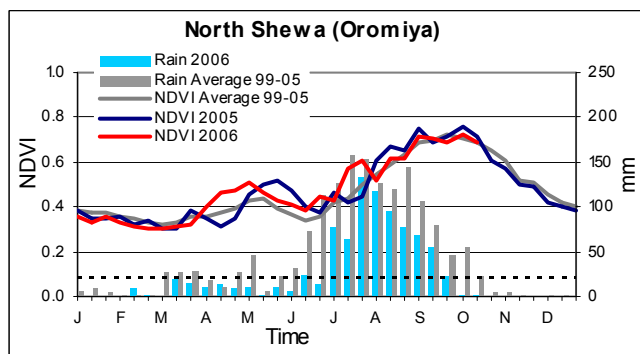
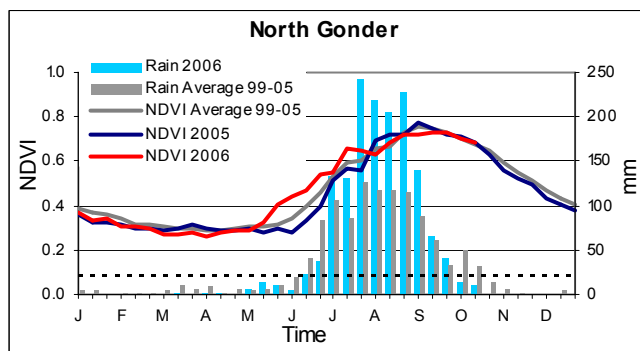
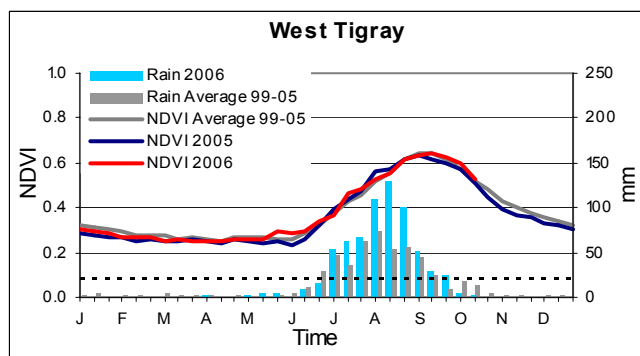
NDVI Absolute Difference 2<sup>nd</sup> Dekad October Act-Prev (background)

Due to the high variability of the environmental conditions in Ethiopia, specific administrative units have been selected in order to illustrate and to reflect some of the crop conditions. These administrative units have been chosen based on their crop production importance at national level. The five units chosen represent a little bit more than 40 % of the national sorghum production (2004).

The main sorghum production areas have been corrected based on the information produced in the new IFPRI-CSA-EDRI Atlas of Ethiopian Rural Economy. A 20 mm rain dotted line has been added to the NDVI-Rain graphs to reflect in a certain sense a water limiting factor for crop growth.

Legend of Food crop situation :

 Very bad; 
  Bad; 
  Near Normal; 
  Good; 
  Very Good

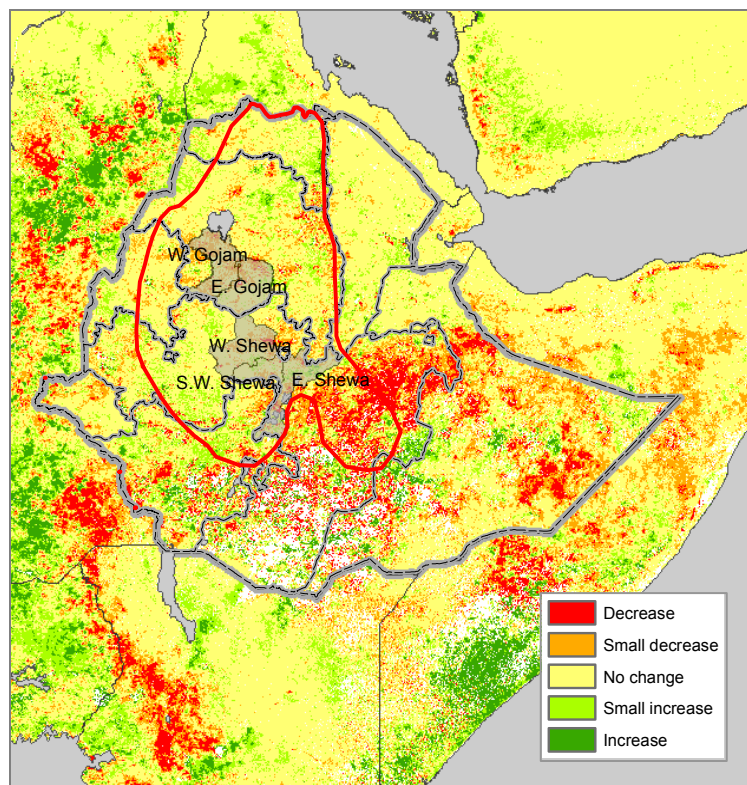


## Teff



### Highlights

The NDVI map shows, for the main Teff production areas, normal conditions in the centre of Ethiopia and small decrease patches in the south eastern part. The NDVI profiles of the Teff areas are similar to average and to last year. The rainfall conditions are below last year for this dekad.




**Location of the Teff monitoring areas (gray)**  
**Location of the main Teff production area (red outline)**

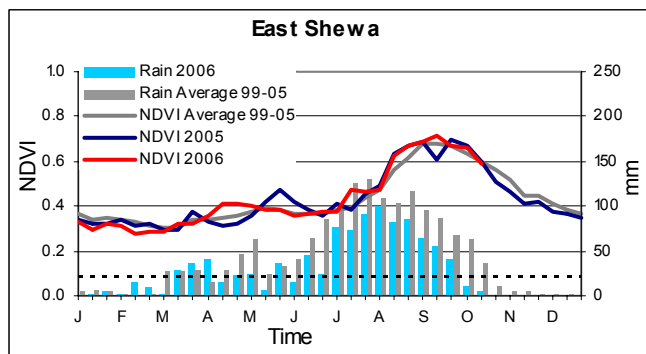
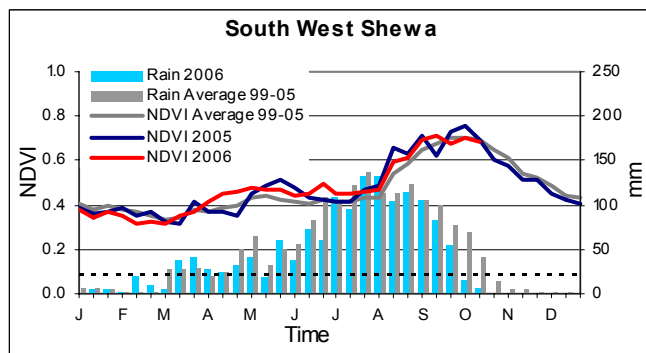
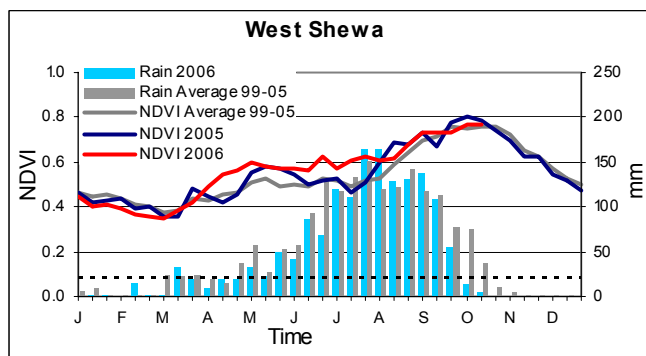
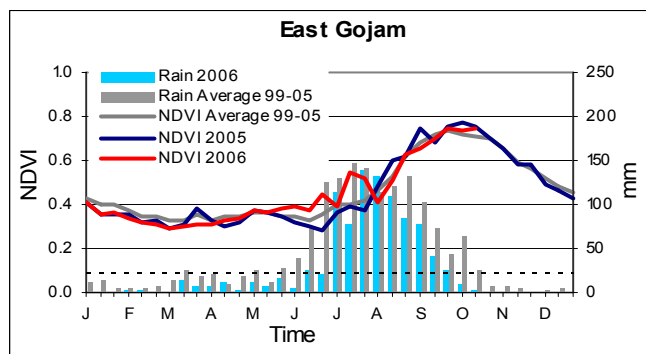
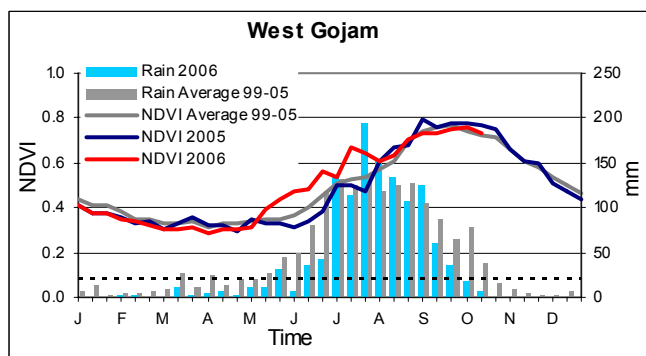
NDVI Absolute Difference 2<sup>nd</sup> Dekad October Act-Prev (background)

Due to the high variability of the environmental conditions in Ethiopia, specific administrative units have been selected in order to illustrate and to reflect some of the crop conditions. These administrative units have been chosen based on their Teff production importance at national level. The five units chosen represent a little bit more than 40 % of the national Teff production. (2004)

The main Teff production areas have been corrected based on the information produced in the new IFPRI-CSA-EDRI Atlas of Ethiopian Rural Economy. A 20 mm rain dotted line has been added to the NDVI-Rain graphs to reflect in a certain sense a water limiting factor for crop growth.

Legend of Food crop situation :

 Very bad; 
  Bad; 
  Near Normal; 
  Good; 
  Very Good



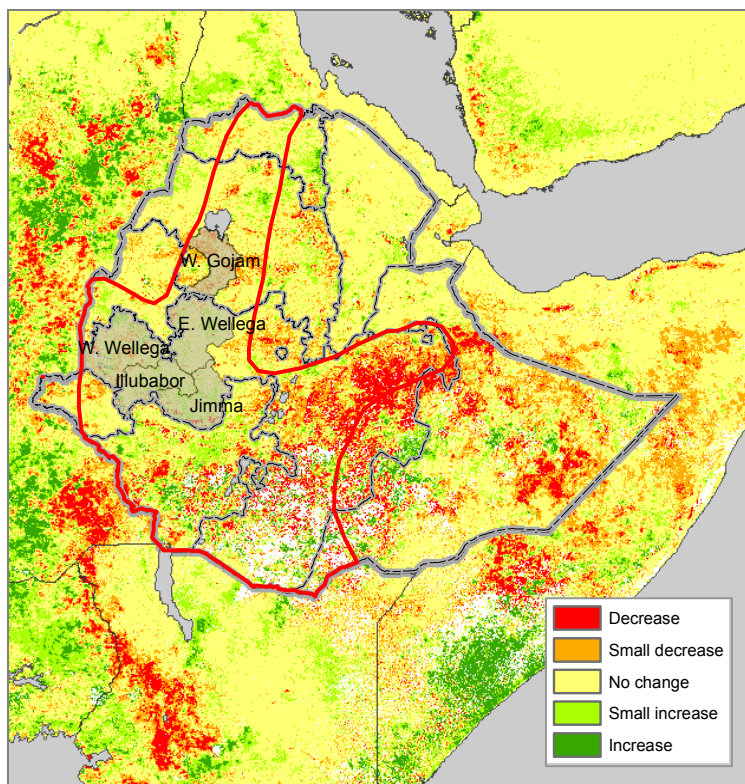


## Maize



### Highlights

As for the other crops, the NDVI map of the Maize production areas shows globally normal conditions with nevertheless patches of decrease in the eastern regions of Oromiya. The NDVI profiles for the Maize areas are similar to last year NDVI profiles, rainfall is slightly below last year during this dekad.



**Location of the Maize monitoring areas (gray)**  
**Location of the main Maize production area (red outline)**

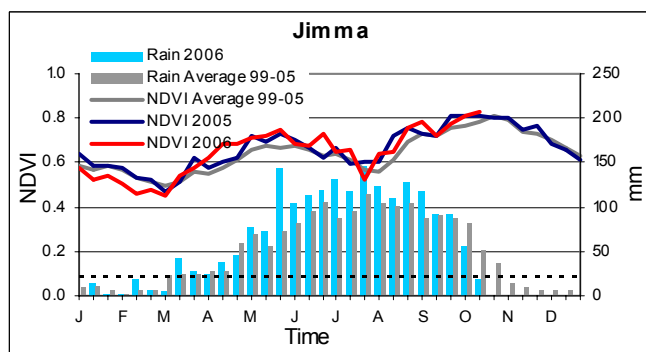
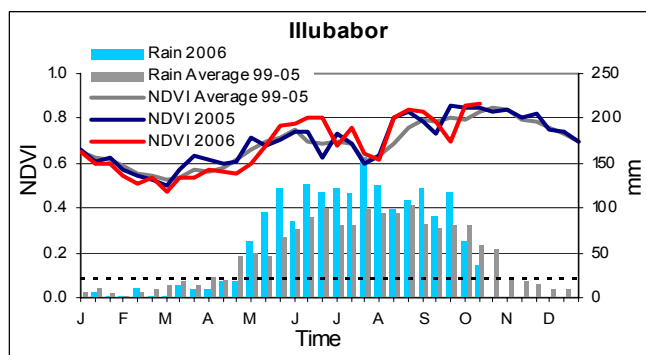
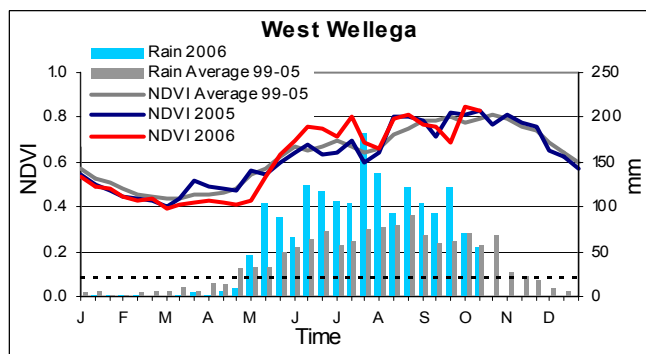
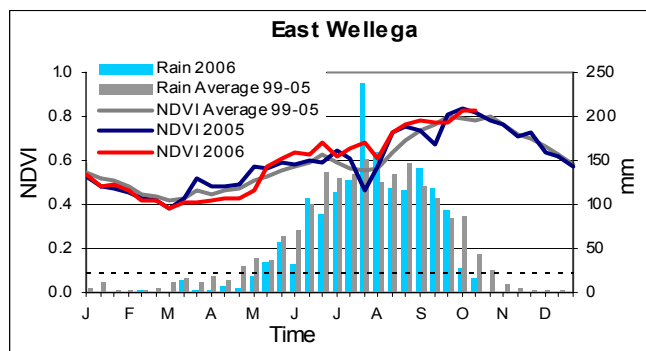
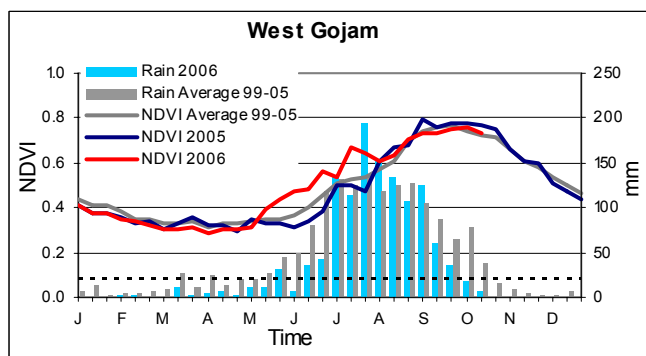
NDVI Absolute Difference 2<sup>nd</sup> Dekad October Act-Prev (background)

Due to the high variability of the environmental conditions in Ethiopia, specific administrative units have been selected in order to illustrate and to reflect some of the crop conditions. These administrative units have been chosen based on their Maize production importance at national level. The five units represent more than 40 % of the national maize production (2004).

The main Maize production areas have been corrected based on the information produced in the new IFPRI-CSA-EDRI Atlas of Ethiopian Rural Economy. A 20 mm rain dotted line has been added to the NDVI-Rain graphs to reflect in a certain sense a water limiting factor for crop growth.

Legend of Food crop situation :

 Very bad; 
  Bad; 
  Near Normal; 
  Good; 
  Very Good

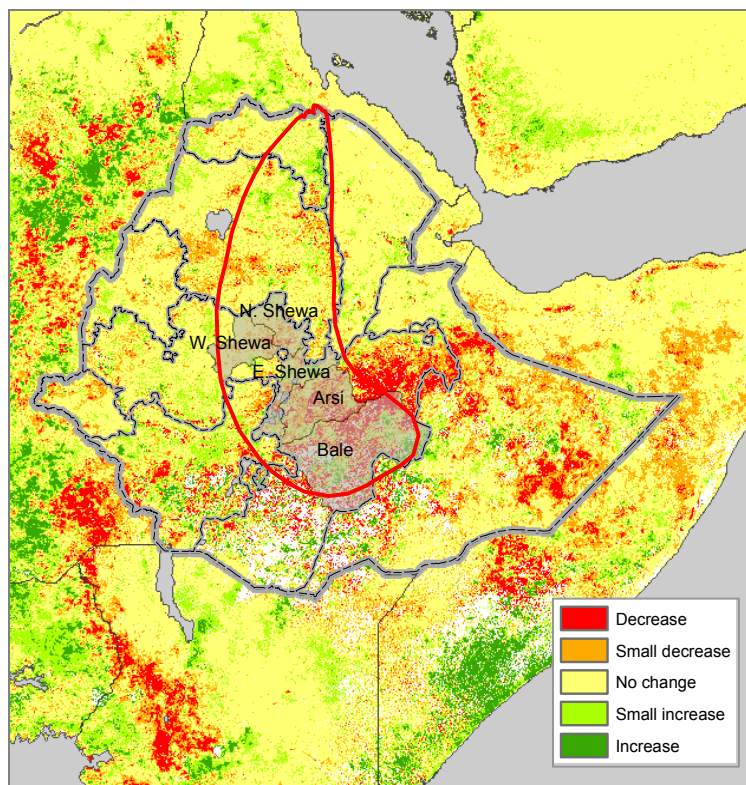




## Wheat - Barley

### Highlights

The NDVI map of the Wheat-Barley production areas shows patterns similar to the other crops, vegetation conditions are normal. The different profiles for the main Maize-Barley zones are similar or above last year conditions. For this dekad, the rainfall conditions are clearly below last year.





**Location of the Wheat-Barley monitoring areas (gray)**  
**Location of the main Wheat-Barley production area (red outline)**

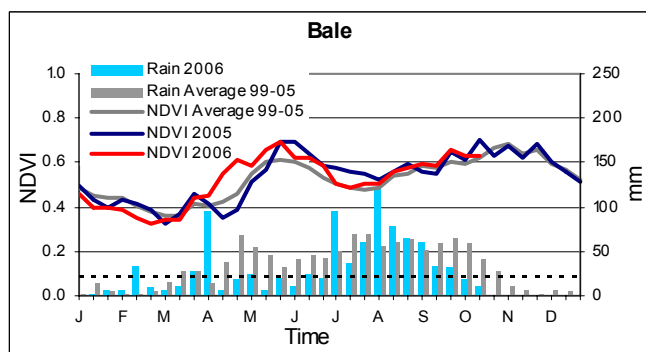
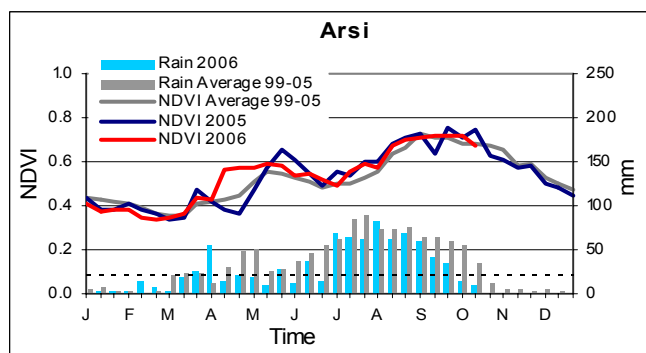
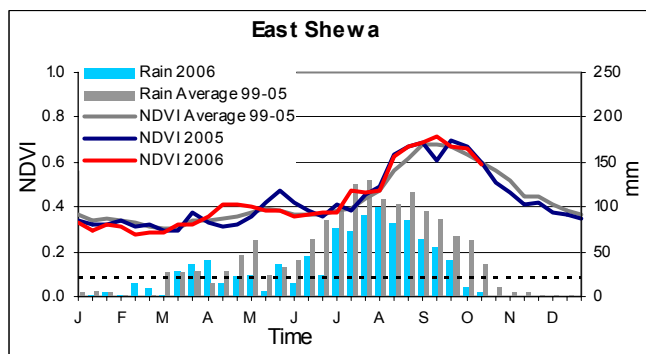
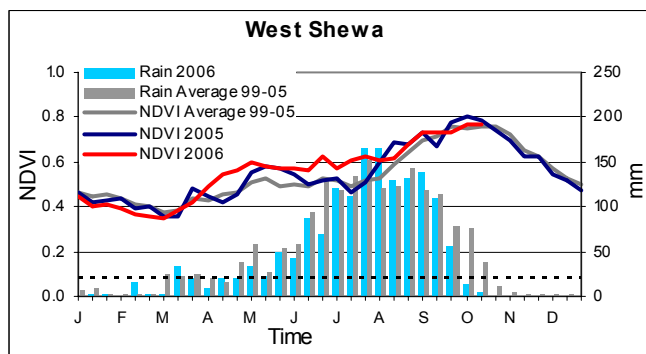
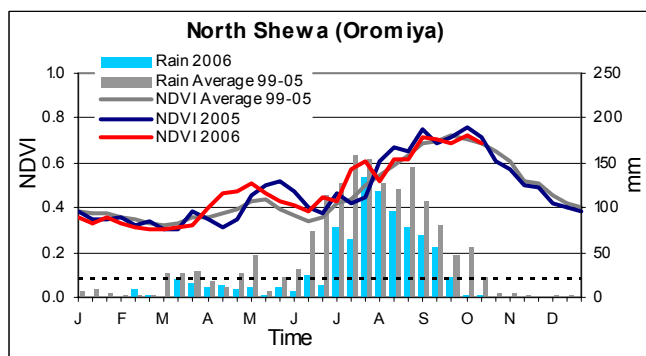
NDVI Absolute Difference 2<sup>nd</sup> Dekad October Act-Prev (background)

Due to the high variability of the environmental conditions in Ethiopia, specific administrative units have been selected in order to illustrate and to reflect some of the crop conditions. These administrative units have been chosen based on their Wheat-Barley production importance at national level.

The main Wheat-Barley production areas have been corrected based on the information produced in the new IFPRI-CSA-EDRI Atlas of Ethiopian Rural Economy. A 20 mm rain dotted line has been added to the NDVI-Rain graphs to reflect in a certain sense a water limiting factor for crop growth.

Legend of Food crop situation :

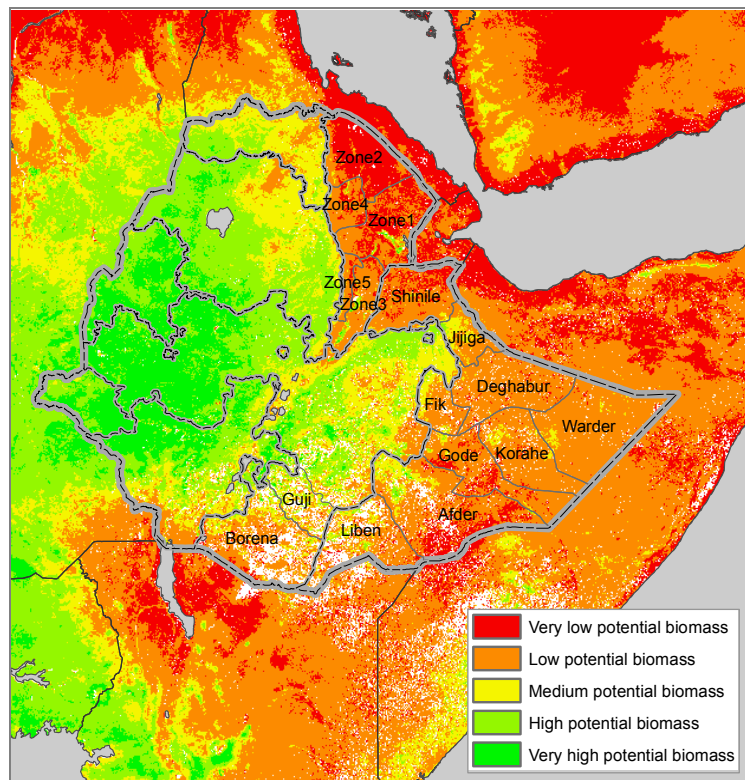
 Very bad; 
  Bad; 
  Near Normal; 
  Good; 
  Very Good



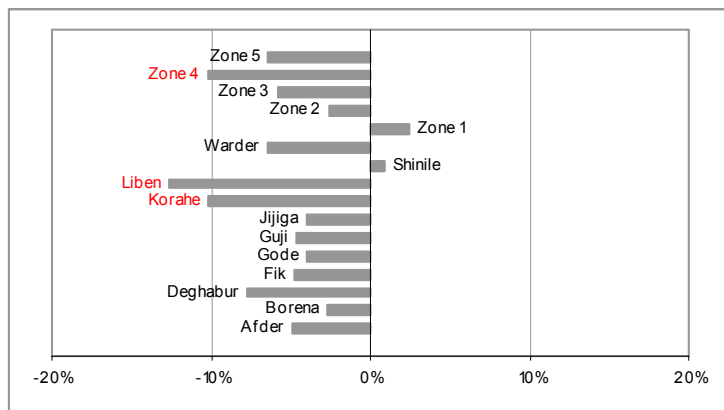
## Pastoral areas

### Highlights

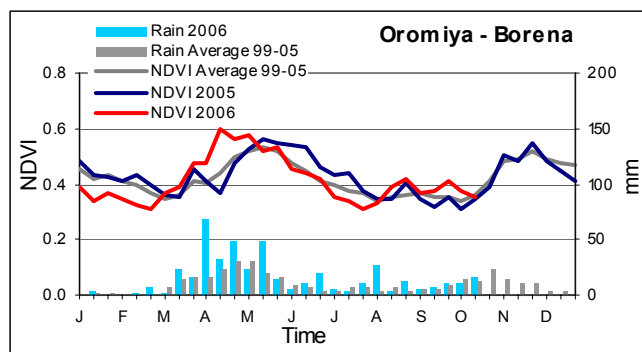
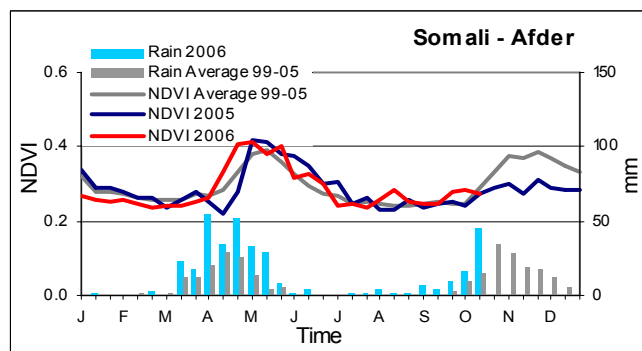
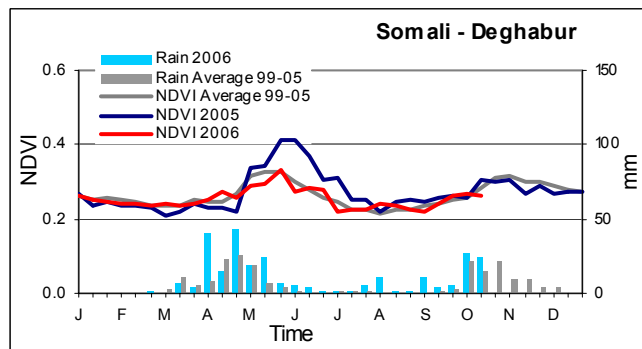
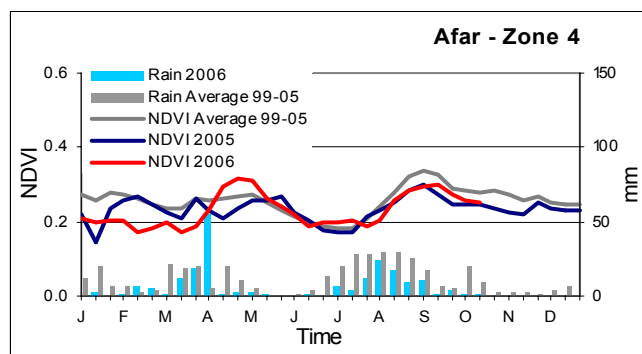
The rainfall derived from ECMWF model is globally normal in the pastoral areas of Afar, Somali, Oromiya and SNNPR. The NDVI profiles of the administrative zones are slightly above last year profiles. Rainfall conditions are normal or above normal for this dekad in the four zones. The graph of the NDVI difference (compared for this dekad with the 7 years NDVI average) for each zone shows negative differences for all the zones except for the eastern zones of Afar zone 1 and Somali Shinile.



SPOT-VGT NDVI Image 2<sup>nd</sup> Dekad October 2006 (background)



NDVI difference 2<sup>nd</sup> Dekad of October 2006 / 1999-2005 average (in %)



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