Landscape Transformation and Sustainable Development in Ethiopia

Background information for a study tour through Ethiopia, 4-20 September 2006

University of Bern
Institute of Geography

2007

Cover photographs

Left: Digging an irrigation channel near Lake Maybar to substitute missing rain in the drought of 1984/1985. Hans Hurni, 1985.

Centre: View of the Simen Mountains from the lowlands in the Simen Mountains National Park. Gudrun Schwilch, 1994.

Right: Extreme soil degradation in the Andit Tid area, a research site of the Soil Conservation Research Programme (SCRP). Hans Hurni, 1983.

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Contents

Preface

This report presents background material used by participants in a joint Ethiopian-Swiss study tour through the north-central highlands of Ethiopia. The main theme of the tour was 'land transformation and sustainable development'. The tour took place from 4-20 September 2006, starting in Addis Abeba and continuing through North Shewa, Wello, Gonder and Gojam. This report is a structured compilation of information gathered by MSc candidates and scientists from the University of Bern prior to the study tour, and supplemented with daily reports by all participants after the study tour was completed.

The tour was prepared, organised and supported by members of the Institute of Geography, University of Bern, the Regional Coordination Office (RCO) of the Joint Areas of Case Studies (JACS) 'Horn of Africa' of the Swiss National Centre of Competence in Research (NCCR) 'North-South' in Addis Abeba, and the 'East and Southern Africa Partnership Programme' (ESAPP) of the Centre for Development and Environment, Institute of Geography, University of Bern. The participants in the study tour were Swiss MSc candidates in Geography as well as staff and students from various faculties and disciplines at the Ethiopian Universities of Addis Abeba, Mekelle and Haramaya, and from the Amhara Regional Agricultural Research Institute (ARARI). The tour was jointly directed by members of the University of Bern and the RCO in Addis Abeba. The names are listed at the end of the report.

The theme of the report indicates that a major interest of the participants in this study tour was human use of landscapes, changes in landscape use in the recent and more distant past, and ways and means of overcoming problems of non-sustainable development in future. Parts I and II guide the reader through information on socio-economic and bio-physical contexts, while Part III addresses issues of sustainable development in five dimensions: ecological, social, economic, political, and institutional. Part IV adds several case studies at locations visited during the tour, including research stations of the former Soil Conservation Research Programme (SCRP), which was executed by the University of Bern and the Ethiopian Ministry of Agriculture from 1981-1998. These research sites are now managed as sub-stations by ARARI. Other sites include the field research areas of PhD candidates in the Swiss National Centre of Competence in Research (NCCR) North-South programme, and locations in the Simen Mountains National Park, an area that has been the focus of long-term collaboration between Swiss and Ethiopian institutions since the late 1960s. Part V consists of the daily reports written by the tour participants.

The study tour was thus an opportunity to observe and discuss long-term changes over several decades, as well as the impact of various government policies and programmes during this period of time. Landscape evolution over several millennia, as well as opportunities for sustainable development in rural Ethiopia, were discussed during the study tour.

The material compiled by the Swiss students was drawn mainly from information available at the Centre for Development and Environment (CDE) as well as from library and Internet sources. Given the relatively low level of involvement of most of the people in charge of this work, both in the subjects of the specific chapters as well as in Ethiopia, errors and misinterpretations may be present, despite some critical reading by the organisers. Readers are asked to keep this in mind while reading the report. Although participants had the opportunity to correct inconsistencies after the tour and on the basis of discussions held in Ethiopia, this report is not an analysis of the current situation in Ethiopia nor does it claim to be exhaustive.

The study tour departed from Addis Abeba, travelling along the eastern escarpment towards the northeast to Weldiya, then westwards through the watershed between the Blue Nile and Tekeze River basins to the Gonder area in the north-western highlands. It then proceeded as far as the Simen Mountains, and returned to Addis Abeba via Bahr Dar and Gojam area. Although this tour may appear to be similar to the historic route, very few of the tourist attractions along the way were visited, unfortunately. Instead, participants focussed their attention on rural situations in areas that are often accessible only on foot, and the tour included several overnights in tents, near or farther away from the main roads.

The tour leaders are grateful that the study tour was safe and successful, and hope that the insights into rural Ethiopia, the vivid exchanges among the participants with local land users and between different disciplines, and the fruitful and stimulating period of travelling together will last well into the future.

Karl Herweg, Heinz Veit, Amare Bantider and Hans Hurni

Part I - Socio-economic overview

1 Agriculture and rural setting of Ethiopia

Compiled by Daniel Loppacher and Sylvia Lörcher

Abstract

Ethiopia is a relatively large country with a surface area of about 1.225 million km^2. It is characterised with fertile soil, a large water resource potential and extensive plant and animal genetics. An estimated 65 percent of the countries total area is suitable for agricultural purposes. In the following subchapter there will be a short overview of the Ethiopian agriculture giving an idea on the extent and importance of agriculture for the country, followed by the subchapter on problems this sector is facing today, then leading to possible approaches to overcome these problems and ending with the subchapter on a brief summary dealing with the education on agriculture. After focusing on agriculture, the second thematic part of this chapter will be about rural settings. Starting with a short outline of the term 'rural', the different landholding systems will then be introduced before, during and after the land reform in Ethiopia.

1.1 Overview

Agriculture is the most important sector of the Ethiopian economy. It accounts for about 45 percent of the Gross Domestic Production (GDP), 90 percent of the foreign exchange earnings and 85 percent of the total employment (Fisseha Frehiwot 1997). Both, industry and services, are dependent on the performance of agriculture, which provides raw materials, generates foreign currency for the importation of essential inputs and supplies the people with food, fibre and fuel.

The country with its distinct climate zones suitable for various types of agricultural undertakings and therefore high agro-ecological diversity is cultivated with different kinds of crops. Crop production contributes about 30 percent of the GDP and about 62 percent of the aggregate value in agriculture.

The major crops produced include cereal (*tef*[1], maize, sorghum, barley, wheat, millet, oats), pulses (faba bean, chickpea, field pea, haircoat bean, grass pea, lentil, fenugreek), oil crops (noug, linseed; rapeseed, sesame), roots and tubers (inset, potato, sweet

1 Tef *(Eragrostis tef)* is a crop belonging to the *Poaceae* family and is only found in Ethiopia today. It is similar to sorghum and is widely used for cooking the Ethiopian national dish.

potato, taro, yam), vegetables (tomato, onions, brassicas), fruit crops (citrus, grapes), coffee, sugar cane, *chat*[1], spices and cotton.

Cereals cover 74,5 percent of the cultivated land, which means about seven million hectares. They are followed by pulses (11,4 percent), perennial such as coffee or inset (seven percent), oilseeds (4,3 percent) and 2,5 percent of other annual covering (Fisseha Frehiwot 1997).

The agricultural production of Ethiopia is influenced by different agro-climatic regions. These different regions are shown in the figure below:

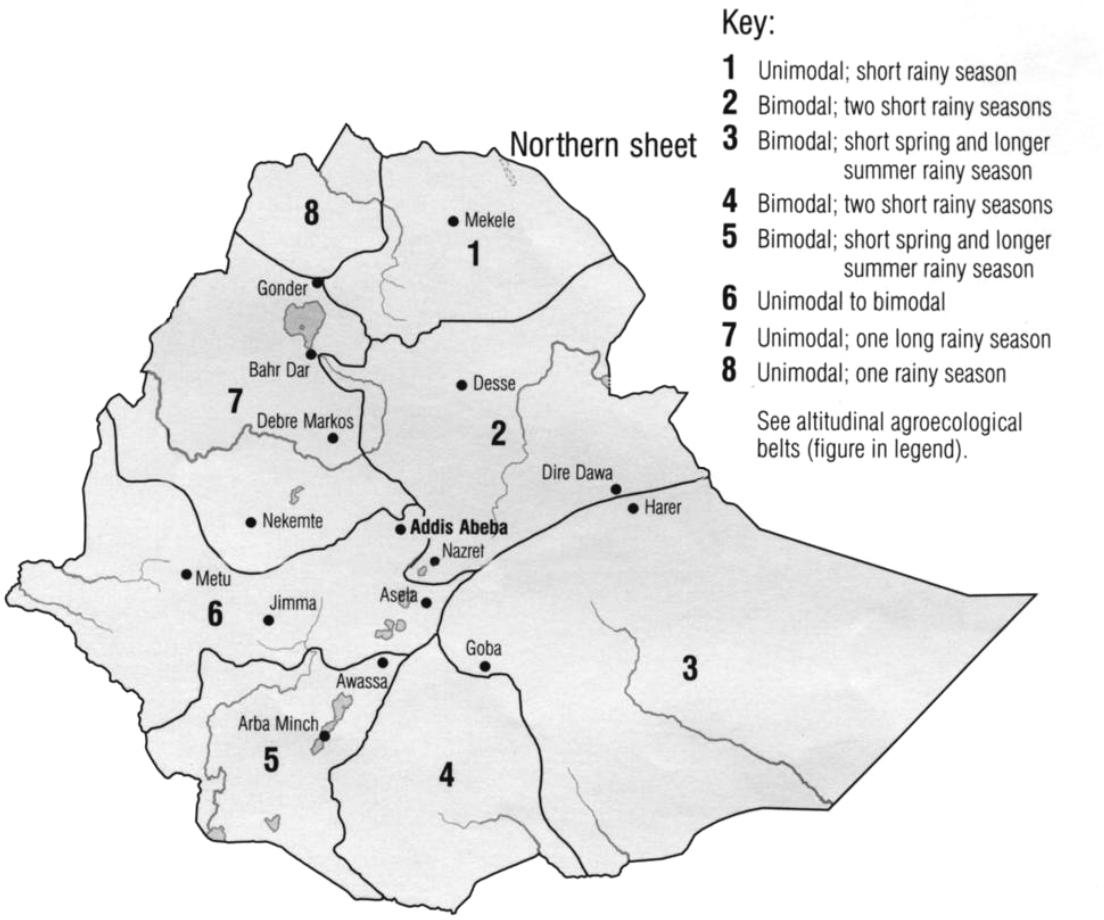


Figure 1-1: Generalised agro-climatic regions (Hurni 1998)

There is not only a horizontal but also a vertical diversification. It is distinguished between six altitudinal belts. Due to limitations to certain crops in different highs, different crops are planted in those altitudinal belts.

1 Plant, with narcotic matters. Chewing its leafs has a stimulating effect on the body circulation.

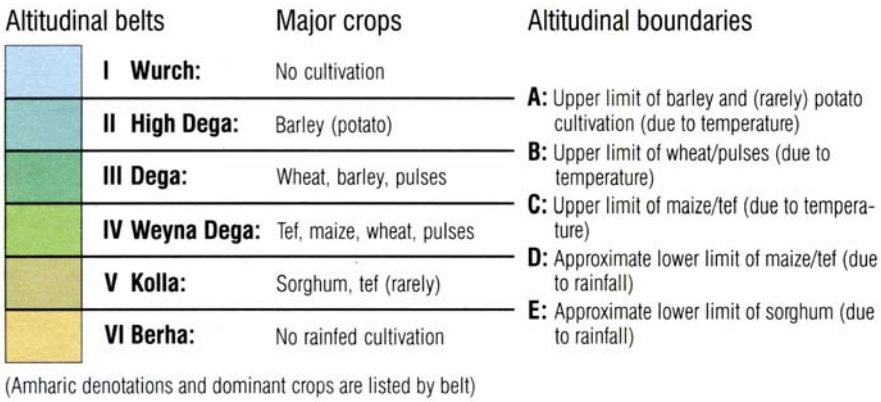


Figure 1-2: Key to altitudinal belts and rainfed crops (Hurni 1998)

The exact range of the altitudinal agro-ecological belt varies depending on the agro-climatic region.

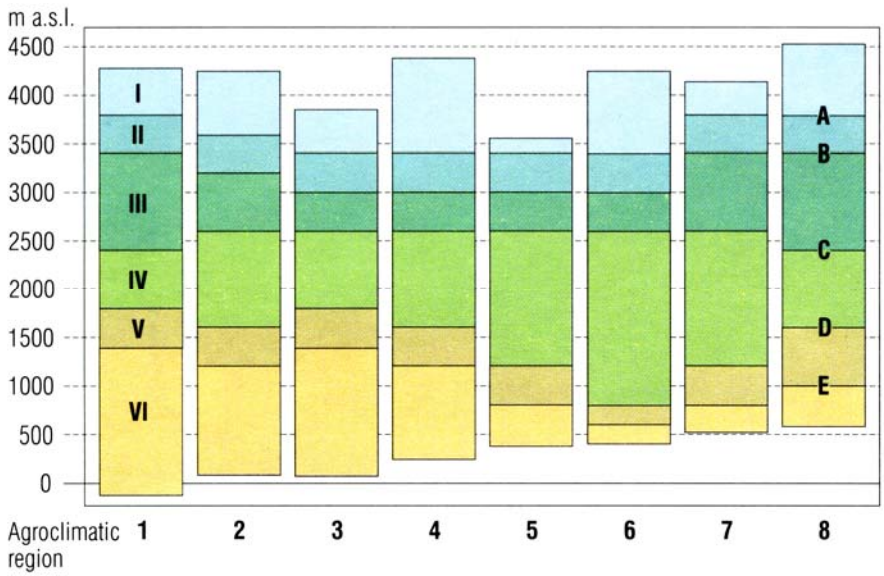


Figure 1-3: Altitudinal agro-ecological belts in each agro-climatic region (Hurni 1998)

The country has more livestock than any other African country with 31,76 million cattle, 12,8 million sheep, 9,97 million goats, 4,4 million equine, and 33,35 million poultry birds (AESE 1996: 141).

In Ethiopia, plough cultivation has remained ubiquitous. At least until recent times, it has been the only country in Sub-Saharan Africa where plough cultivation is used on large scale. In the lowlands, where there is a huge concentration of cattle, the need for adoption to plough cultivation has not been felt; here people practice nomadic or semi-nomadic pastoralism (AESE 1996: 34ff).

Small-scale farmers following traditional low input and low output farming technologies dominate agriculture. The agricultural households are estimated at about 8.68 million with an average farm-family size range between 4,63 and 7,02 persons

with a national average of 5,17 (AESE 1996: 143). Although Ethiopia has one of the most complex and diverse land tenure systems in the developing world.

1.2 Problems faced by agriculture

Ethiopia has gone through some severe droughts and famines, for example from 1972 to 1974. Nearly one million people died in another drought from 1984 to 1986. The country's agriculture is not able to feed the fast growing population. It is facing a decline in the per capita food production due to various reasons (Figure 1-4).

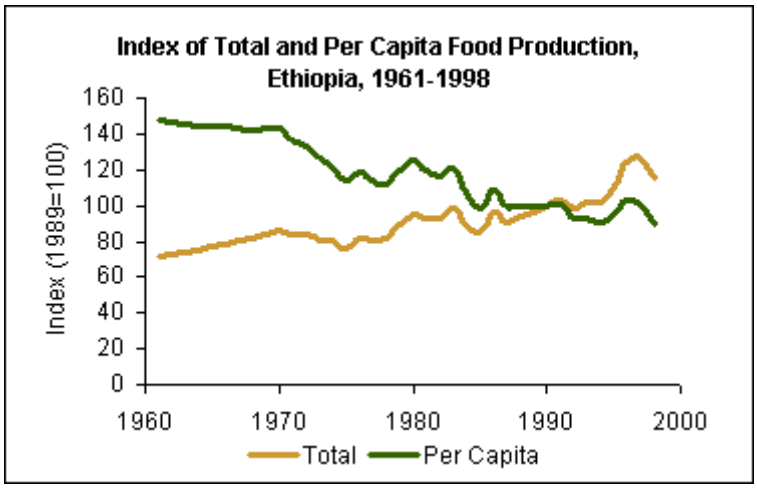


Figure 1-4: Food Production (WRI 2003)

"The major causes for the decline in per capita food production are indicated to be the rising population growth rate of above three percent, widespread poverty, inappropriate allocation of property rights, and government policy. These factors are also considered as the major causes for unstable resources management in agriculture, which has a negative impact on increasing productivity" (AESE 1996: 8).

The population growth rate is above the agriculture production rate, which results in a declining food rate per person even though the agriculture production itself is actually increasing.

The high population growth and the huge number of livestock result also in overgrazing, over-cultivation, deforestation and desertification, which again are linked with soil erosion. Soil erosion is a severe problem agriculture is facing in Ethiopia. Due to the huge loss of fertile soil, important cultivable area is lost.

Abbi Mamo mentions in the chapter on environment, population and agricultural development in Ethiopia that next to the population pressure the food shortage problem is mainly caused by long periods of drought, which is basically a result of environmental degradation (Dejene Aredo 1995: 68). The following example shall help to understand how complex the not sufficient production problem of the Ethiopian agriculture is: the farming families are facing declining fuel-wood supplies due to

diminishing tree stocks. They switch to burning crop residues and dung fuel, which are basic elements in fixing nutrients in many farmlands. This chemical degradation leads to soil fertility loss and burning crop residues also leads to declining livestock feed and animal productivity. One of the obvious consequences of soil fertility loss, also due to erosion, is seen in reduced crop yields. And further, in the long run soil degradation compels farmers to move into marginal lands (Dejene Aredo 1995: 72ff).

The various problems of the agricultural sector have lead to a dependence on foreign food aid of Ethiopia.

1.3 Governmental approaches

"The problem of Ethiopian agriculture cannot be primarily explained by natural endowments. By any measure, Ethiopia is well endowed at least in part with fertile soil, abundant water resources and good climatic conditions until recently. What needs careful analysis is why Ethiopian farmers continue to practice essentially the same farming methods with very little technical or management improvement for so long" (GebreSelasse Samuel 2006).

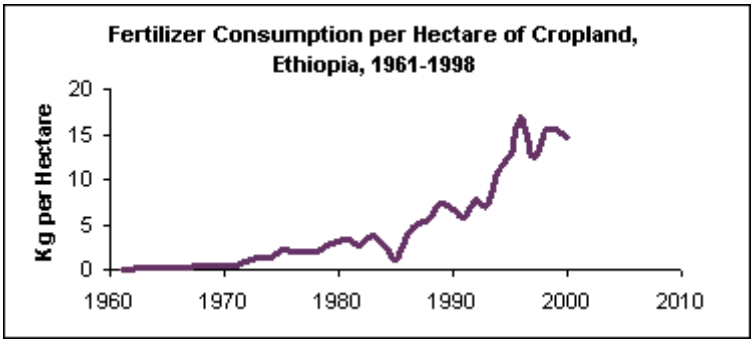
Trying to improve technologies in agriculture such as improved seed and fertiliser (Figure 1-5) and diffuse it in order to increase the agriculture production has dominated development thinking for the past four decades. Previous Ethiopian governments have also implemented this strategy in the 1960s and 1970s. But no government in the country's history has invested so much political capital on this strategy as the current one. "Not only has it accorded priority to the agriculture sector, it has made agricultural development the centrepiece of its overall development strategy" (GebreSelasse Samuel 2006). Due to the fact that over 80 percent of the Ethiopian people work in agriculture, any development programme in the nearer future will deal with agriculture.

In 1984, when famine ravaged some 20 African countries south of the Sahara the Sasakawa-Global 2000 Project was established by two humanitarian, non-profit organisations. The primary goal of the SG 2000 project was to develop programs for technology demonstration in cooperation with national extension services to overcome the African food crises (AESE 1996: 182ff).

Then, in Ethiopia a massive extension program was started under the transitional government in 1993/94 to diffuse agricultural technology (particularly fertilisers and improved seeds).

In 1995 the Ethiopian People Revolutionary Democratic Front-government formulated a development strategy centred on agriculture: The Agriculture Development Led Industrialisation strategy (ADLI), which continues to be the country's strategy until today. It sets out agriculture as a primary stimulus to generate increased output, employment and income for the people, and as the springboard for the development of the other sectors of economy. "Policy makers assumed that significant productivity

growth could be easily achieved by improving farmers' access to technologies which would narrow the gap between framers' yield and what agronomists called 'exploitable yield potential' "(GebreSelasse Samuel 2006). The Ethiopian government formulated a smallholder intensification extension program known as Participatory Agricultural Demonstration Training Extension System (PADETES) in 1994/95 to attain this yield difference. The objective of PADETES was to achieve pro-poor sustainable development in rural areas through increasing farm productivity, reducing poverty and



increasing the level of food security.

Figure 1-5: Fertiliser consumption (WRI 2003)

These governmental approaches are criticised to be only focusing on technology promotion. Even though technology is important, there are other objects to consider such as the social structure of accumulation processes or the factors that affect decisions by farmers (institutional configuration, governance, risk behaviour patterns, etc.). Farmers need to be taken more in account. In order to use improved technologies such as fertiliser for example, farmers need credit, to be able to buy it. Climate change doesn't ensure enough rain and for this reason cannot guarantee the farmers' ability to pay back the credit. Instead, if there is a drought, the fertiliser even kills the plants. The program packages are therefore often not used as a whole because of the high risk.

Nevertheless there has been an increase in using improved seeds and using fertiliser and therefore an increased yield (GebreSelasse Samuel 2006).

1.4 Education and agriculture

Habtemariam Kassa writes in the chapter on Agricultural Education, Research, and Extension in Ethiopia about the importance of agricultural education the following: "Agricultural education is essential for the generation and adoption of improved techniques and also helps to assure the planning and implementation of polices and programs that are basic to make progress in agriculture. In Ethiopia, university-level agricultural education started in 1952 with the establishment of the Agricultural College of Alemaya, which is now known as the Alemaya University of Agriculture since 1986. Since then, only half a dozen agricultural colleges and institutions have been opened in the country over the years" (AESE 1996: 162ff).

Education especially in agriculture is very important for Ethiopia to make use of the grate potential of the country and thereby fulfil the need for improving agricultural productivity and efficiency.

1.5 The definition of rural in Ethiopia

In most cases, a low population density is taken as one criterion in defining the term 'rural', but in the case of Ethiopia's rural areas, this leaves a certain ambiguity. Areas over 2'000 inhabitants are already defined as 'urban' by the Central Statistics Office of Ethiopia although certain more densely populated areas with more than 3'000 persons in one peasant association, such as Entaye (South-east of Awassa), with semi-urban characteristics are designated as rural communities.

"Thus, in summary, rural regions in Ethiopia would have the following main characteristics (Wudnesh Hailu 1991: 8):

- they can be both sparsely or densely populated;
- the means of livelihood is subsistence agriculture;
- no pipe water and electricity supplies;
- poor housing conditions and no toilet facilities;
- little infrastructure and/or public services, like means of transportation, clinics, schools, telecommunication and post office services;
- rural families are very traditional, and family solidarity, good relationships among neighbours, and neighbourhood assistance are important."

1.6 Rural land holding in Ethiopia

The landholding system in Ethiopia differs hardly from the European concept of ownership and can only be understood within an African cultural tradition, in which land is a free gift to mankind and cannot be taken away from a person. "Rights always concerned the use of land, never land as a commodity, as property – until the development of a distinctive urban culture and mentality created a difference between rural and urban land" (Pausewang et al. 1990: 38). In the African context, ownership of land is an entirely urban concept.

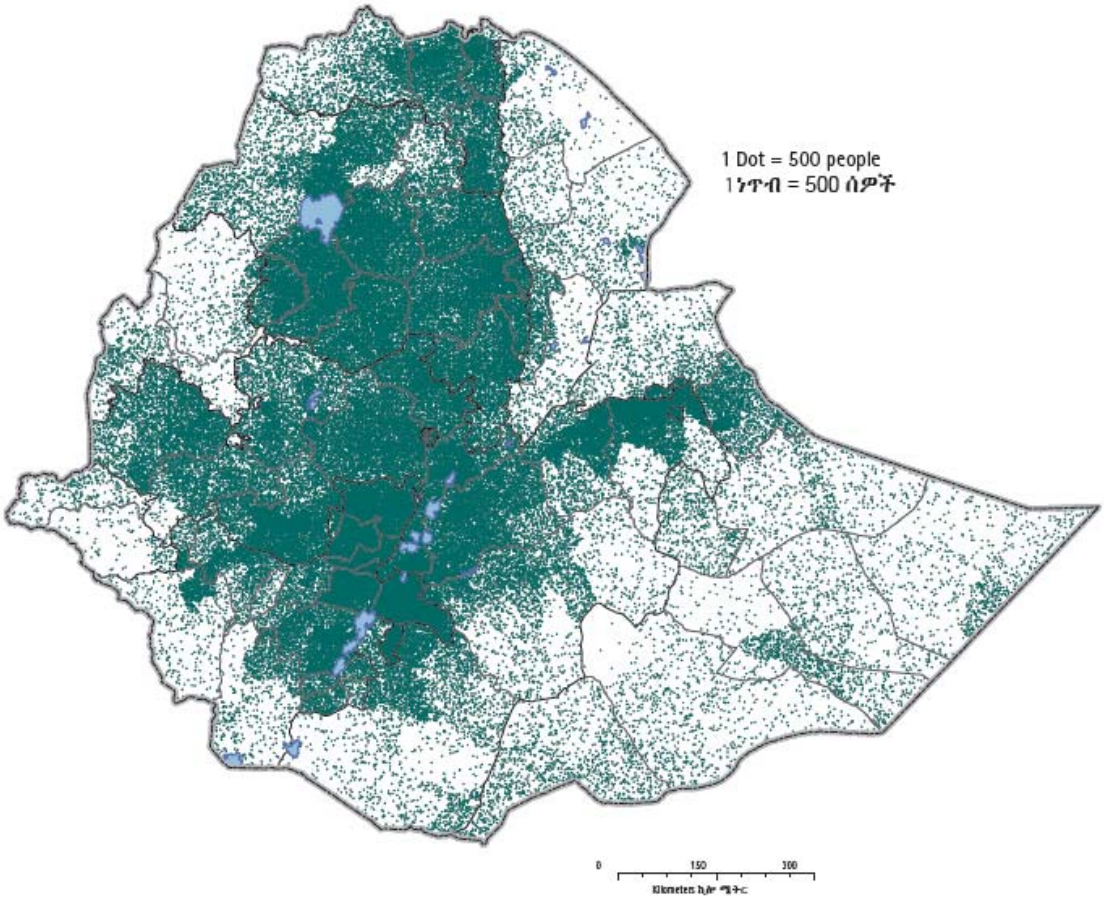


Figure 1-5: Population dot map of Ethiopia (CSA, EDRI and IFPRI 2006, 2004 projections based on 1994 Ethiopian Population and Housing Census, Central Statistical Agency)

1.6.1 Landholding system before the land reform

Three major landholding systems are to be identified in pre-revolutionary Ethiopia: the *rist* tenure and the *semon tenure* in the north (Amhara, Tigray, Wollo, Gonder, Gojam, and Northern Shewa) and the *gult* or *gebar* tenure in the south. However this description is operating at only the highest levels of generality because of the huge variability of the tenure forms throughout the country. Although "these terms did not directly imply ownership, but referred to the rights and duties of the title-holders" (Ludi 2006: 4).

The *rist* tenure is based on kinship or community in which peasants were assured lifetime rights of landholding. Land could not be sold, leased or given to an other ones use "and the community was collectively responsible for a fair distribution, and could re-allocate land at any time" (Pausewang et al. 1991: 40). Although "the rights conferred by *rist* were valid for a lifetime and extended over many generations. Following the death of a *ristegna* (person who held *rist* rights), his or her rights were distributed equally among sons and daughters" (Ludi 2006: 4). According to Wudnesh Hailu (1991) landlessness and tenancy were said to be minimum where this system was practiced.

In the *semon* the Ethiopian Coptic Church had the right to tenure on land belonging to the state. "The church leased the semon land and got returns in the form of a crop-sharing system, a fixed tribute, or taxes" (Wudnesh Hailu 1991: 20).

The third system, the *gult* tenure, is more or less a feudal system "with state-holdings in large estate forms, usually granted to the family members of ruling aristocrats, royal families, and to those who performed loyal services to the crown." (Wudnesh Hailu, 1991: 20). The indigenous peasants who originally owned the land had to lease small plots from the private holders *(gultegna)* and became a kind of bond slaves. "A *gultegna* could collect payment from *ristegnas* in the form of tributes, taxes or labour" (Ludi 2006: 4), and in turn he had to pay a part from the taxes he collected from the farmers to the emperor. The bad situation of the tenants was characterised through an oral lease of short duration with a high risk of becoming landless because members of the royal families or powerful landlords could any time take his holdings.

1.6.2 The land reform

In 1974 the revolutionary government took power after overthrowing the monarchy and initiated an extensive reform programme. Within the land reform law all land was nationalised and should be in property of all Ethiopians. One was willing to reintroduce the collective property as in the traditional social forms. "Nationalisation was designed to ensure that export revenues would flow directly into the state treasury as well as to increase smallholder production and dissolve the dependency relationship, which existed between farmers and the elites. The revolutionary government expropriated large farms and established state farms, while also trying to transform the independent smallholder subsistence sector into agricultural co-operatives as rapidly as possible. No redistribution of land was originally planned in the predominantly Amharic provinces where the *rist* system was prevalent" (Ludi 2006: 6). Although every family became the right of at least 10 ha arable land and all kind of contributions except taxes should be abolished. Like in the *rest* system the sale of land was still forbidden and the lease or change of land was now as well prohibited to avoid any kind of dependences. Although the situation of the nomads should be improved, they became ownership rights on the traditional pasture of the tribal. As well the state made the commitment to arrange more possibilities for the permanent farming and therefore make the settlement of the nomads possible. Newly founded Peasant Associations (PA) and Service-Cooperatives were responsible for the carrying out of the land reform, "specifically by assuming responsibility for the distribution of nationalised land, but also by performing political duties and providing judicial authority at the local level. The basic purpose of the PA was to incorporate the rural population into an egalitarian, democratic, participatory organisation and to involve them more closely in decision-making processes" (Arbeitskreis Äthiopien 1985: 42; Ludi 2006: 6).

1.6.3 Landholding system after the land reform

The difference between the times before the land reform "was not the extent of ploughed land, but security on the land, the abolition of contributions to landlords,

debts and work obligations" (Pausewang 1990: 45). An explanation why the land reform was welcomed with great enthusiasm in the south, while in the rist areas of the north sceptic predominated. This because the peasants in the rist system of the north preserved more security of land holding through the kinship or communal system of land tenure, in which the land distribution is regulated by a collective responsibility. According to Wudnesh Hailu (1991), landless peasants who are much better off with a piece of land, however small it may be, than without; tenant farmers; and the nomads who are encouraged to settle and cultivate the land, benefited the most from the gains of the land reform. But only little improvement of the situation was made through the implemented laws and the "present average landholding per rural family household in Ethiopia remains under 2 ha. Major reasons given for the decreased landholding and/or little gain in size of rural landholding after the agrarian reform were (Wudnesh Hailu 1991: 21):

- The 1975 Rural Land Proclamation entitled anyone over 18 years of age to be eligible for a plot of land. A women's right of land allotment is given only to widowed and divorced women, and women who are co-wives of polygamous unions and who receive no support from their husbands can be registered for land as independent family heads (Knoll 2006). This coupled with a rapid rural population growth led to an increased number of rural households, which in turn means that the available land is split up into still smaller plots.
- New landless members joining peasant associations also had an adverse effect on the size of the cultivated area per rural household.
- In the allocation process the landless peasants and nomads got the right to cultivate some land, which again meant that the available land was shared among a greater number of peasants than in the pre-reform era."

The given promises by the state didn't last long. In 1976, the peasant families had obviously more to eat and to drink but what was an advantage for the peasants was a disadvantage for the towns. In the urban centres growing food shortages became serious and conflicts between urban and rural population were the consequence. Already in 1977 the government had to re-introduce taxation and other contributions and so the peasants lost most of the local autonomy and self-administration they enjoyed from 1975 to 1977.

1.7 Conclusion

"Despite much efforts at increasing productivity through introduction of improved inputs over the past three decades or so, average output per hectare of farm land has not shown significant increase to warrant optimism about the sector in the foreseeable future" (EEA/EEPRI 2002). Part of the causes for this situation are major features of the existing land tenure system such as declining farm size, tenure insecurity, and subsistence farming practices. A big part of the agricultural population owns landholding less than the minimum area required for minimum food production. Scarcity of cultivable land still is a serious problem. Yet the land is in the ownership of

the state/public. The government gives licences, so-called "land utilisation rights", to the farmers, usually for five years with a chance for 10 to 20 years. The most part of the agricultural population (it depends on the regions) doesn't want to change the system into a private ownership of land. They are more afraid to lose their plots as in the current system of state/public ownership of land. However the younger farmers have more problems of access to land than the older ones and hence rather wish to change the system. The government argues for the continuation of the existing system for fear of the consequences of the private system. "In particular, it is claimed that free hold will lead to massive eviction of the farming population as poor farmers are forced to sell their plot to unscrupulous urban speculators particularly owing to distress sales during hard times" (EEA/EEPRI 2002). This even though the majority of the farmers pretend not to sell their land if they were given the right to own their plots. They have no alternative possibility to earn money and to feed their families. Probably "a more flexible land holding system centred around providing security of tenure and that takes into account local sensibilities including a mixture of private, state and communal holding might generate significant support among the farming population rather than being fixated by the public/ private dichotomy that characterises the current debate in the country" (EEA/EEPRI 2002).

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2 Secondary and tertiary sector in Ethiopia

Compiled by Manuela Born

Abstract

In Ethiopia, the industry contributes only little more than 10 percent to the GDP, while agriculture and services account for about 45 percent each. The Ethiopian industry is agro-based and produces mostly for the domestic market. The most important sub-sectors are the textile and the food industry. There are different reasons, why Ethiopia never developed a strong secondary sector, including dependence from agriculture, infrastructural and structural problems, non-supportive policies and a lack of man power development. The service sector showed an impressive growth during the 1990s. Both, the secondary and the tertiary sector were highly affected by the policies of the different eras.

2.1 General overview

2.1.1 Shares of the different sectors over time

The most important part of the Ethiopian economy has been and is still formed by agriculture. Even though its share is decreasing (see Figure 2-1) it still accounts for about 45 percent of the country's GDP and more than 80 percent of export and total employment (Permanent Mission of Ethiopia to the United Nations 2002). The share of the secondary sector is much smaller. While manufacturing and handicrafts accounted for ten percent of the GDP in 1975 and 11.4 percent in 1984/85 (CIA World Fact book 1991), today the share is not much bigger.

Figure 2-1 shows that the industry's share of the GDP never climbed much over ten percent since the beginning of the 1990s. The service sector on the other hand increased its share from 35 percent to about 45 percent between 1991 and 2001, accounting in 2001 for almost the same percentage of the GDP as the first sector, which decreased in the same period of time from more than 55 percent down to about 45 percent of GDP (Permanent Mission of Ethiopia to the United Nations 2002). Looking at other sources, however, the numbers are a little bit different. According to the World Research Institute for example, the numbers for 2000 are 52 percent, 11 percent and 37 percent for agriculture, industry and services respectively (WRI 2006). Whatever the exact percentages are, the important conclusion is that the industry's development does not show any big increase, while the service sector seems to be gaining on cost of the

agricultural sector. It is important to note, however, that these numbers concern only the GDP. Regarding the persons involved in the sectors, agriculture still accounts for about 85 percent of total employment.

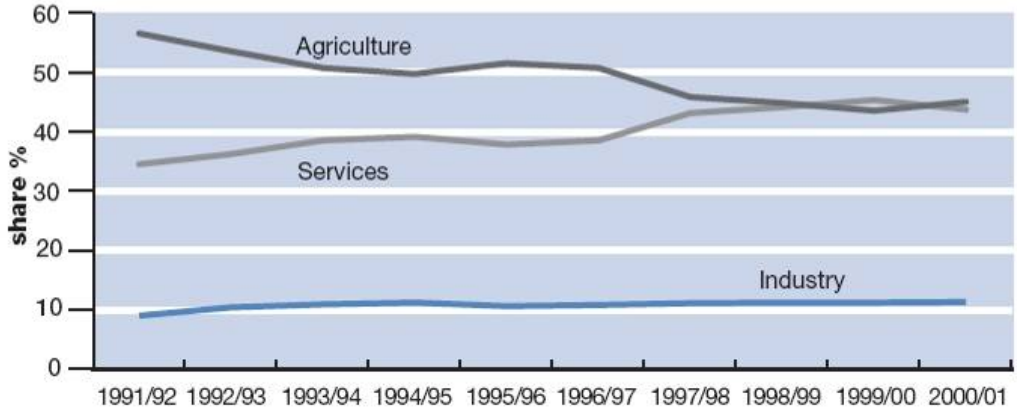

Figure 2-1: Sectoral composition of GDP, Ethiopia, 1991/92 - 2000/01 (percentage of GDP) (Economic Report on Africa 2002)

The distribution of industrial enterprises shows a rather simple pattern: it is determined by the availability of markets and infrastructure, especially the availability of electricity, telecommunication and transport facilities. As a result, industrial establishments are concentrated in only a few areas of the country, namely in Addis Abeba, the Shewa region, Dire Dawa and the Harerge region. Those four regions account for 91.7 percent of all industrial establishments (Government of Ethiopia 1995).

2.1.2 Main industrial goods

Ethiopia's industrial sector is primarily based on agricultural products. Materials from the first economic sector are processed and to a big part sold on the domestic markets (UNCTAD 2002: 90). The sector employs only 0.5 percent of the labour force, and of these the textile and food industries account for over 60 percent. The main manufacturing products are:

- Textiles: The textile industry is the biggest manufacturing industry in Ethiopia, with about 30'000 workers in more than 14 major factories. The industry represents 36 percent of the entire manufacturing industry (Permanent Mission of Ethiopia to the United Nations 2002).
- Leather and leather products: The huge livestock population in Ethiopia provides the supply for the export of live animals, meat and leather products. The export of finished leather and leather products seems to be highly promising (ibid.).
- Fruits, vegetables and flowers: Ethiopia has different regions with a favourable climate for growing different vegetables and fruits for export. During the last couple of years big flower farms were established, mostly owned by foreign companies. The flowers are exported to Germany, Holland, Scandinavia and Middle East countries (Aregu Balleh no date).

- Further: food stuffs, tobacco, beverages, cement, wood, metallic and non-metallic products (Permanent Mission of Ethiopia to the United Nations 2002).

Ethiopia also has deposits of oil, natural gas, gold, platinum, marble, granite and tantalum. Exports of these products, however, are very small compared to their potential. Further resources that have been identified include copper, lead, zinc, silver, limestone, quartz and pyrite (ibid.). Ethiopia has a rich potential in terms of hydroelectric and geothermal energy, which however is only partially exploited (Tekola Dejene and Bakele Tamirat 1990: 20).

2.1.3 Important services

According to the Organisation for Economic Cooperation and Development (OECD), the distributive trade builds the largest part of the service sector in Ethiopia. The sector's growth of 7.4 percent in 1999/2000 was mainly due to the transport and communications sub-sectors. Streets and railways were reconstructed, which boosted the transport sub-sector, and the number of telephones more than doubled. Additionally, a substantial growth in consumption powered the growth performance (OECD 2002: 134). Other important parts of the service sector must be state services like security, education, and health service provision. Also the share of the tourism and the hotel business is growing. Tourism is thought to have the greatest growth potential of any economic activity in the country (Gordon and Carillet 2000: 36).

2.2 Causes for the secondary sector's stagnation

While the service sector is growing, the secondary sector did not show any significant growth rates until the year 2001 (see Figure 2-1). Of course, there are different reasons for that. One example is the dependence on agricultural production. If the first sector has a bad year, the second sector has no chance to get the raw materials it needs for processing. Another problem is the lack of basic infrastructure, especially an insufficient road net.

According to the Government of Ethiopia (1995), seven main points are responsible for the bad performance of the Ethiopian industry:

- "The inadequacy of infrastructure has been one of the major constraints for the industrial development. Roads, energy, water supply, and other facilities have not been developed to support the industrialisation process in the country.
- Although the country's major natural resource base is its rich agricultural potential, it has not been utilised for the development of the industrial sector. The very low productivity in agriculture resulting from the use of outmoded technology could not cope with the demand for industrial raw materials and foreign exchange requirements, in addition to limiting the market for industrial goods.
  Although Ethiopia is known to possess a wide variety of mineral resources, their utilisation is yet to be realised, mineral exploration and exploitation still being at

its infancy. This thwarted the expansion of industries based on mineral resources that would have otherwise made it possible to reap the benefits of comparative advantages.

- The industrial sector is characterised by very low inter and intra-sectoral linkages. It has been unable to produce intermediate inputs, spare parts and capital goods for its own use as well as for use by other sectors of the economy. The sector itself has continued to be import dependent for machinery and equipment, spare parts and other inputs with no possibilities for self sustained development.
- Small and medium scale industries, as well as handicraft and rural industries, were given less priority in the wider spectrum of industrial development. The encouragement and expansion of these industries would have meant an adequate supply of consumer goods, developed domestic entrepreneurship, generated employment opportunities and created inter and intra-sectoral linkages and a balanced regional development.
- Past industrialisation policy was such that it resulted in an unwarranted concentration of industries in and around a few major urban centres. There were no inducements for industrial enterprises to be located in different regions of the country in the interest of promoting balanced regional development.
- The industrial sector has been characterised by capital intensive technology. This has lead to a number of problems. First, the sector has not been able to generate employment opportunities. Second, having been unable to absorb available labour force, the sector has lost a large potential market for its own products.
- The absence of appropriate institutions for man power development and for the selection, transfer, adaptation and diffusion of technology also remained major constraints for industrial development" (Government of Ethiopia 1995).

Another crucial impact had the changing policies of the different regimes ruling the country. Therefore, in the following part the three broad phases starting in the middle of the 20th century shall be discussed: the situation until 1974, the centrally planned economic system from 1974-1991, and the liberalisation and market-orientation since 1991.

2.2.1 Situation until 1974

Until the end of the 1950s, manufacturing was insignificant in Ethiopia. Most of the population's needs, such as clothes, ceramics, machine tools and leather goods, were met by the cottage and handicraft industries. However, factors "including the lack of basic infrastructure, the dearth of private and public investment, and the lack of any consistent public policy aimed at promoting industrial development, contributed to the insignificance of manufacturing" (CIA World Fact book 1991).

In 1957, first five-year development plans diversified the economy. Agro-industrial activity was encouraged and domestically produced goods were substituted. As a result, during the 1960s and the early 1970s manufacturing activity increased. Despite an

annual growth rate of 6.1 percent between 1965 and 1973, manufacturing accounted for not more than five percent of the GDP in 1975 and employed about 60'000 people, but together with handicrafts (weaving, pottery, blacksmithing, leather working and jewellery making) and other small scale industries reached some ten percent. The main characteristics of the manufacturing industry were predominantly foreign ownership, management and professional and technical stuff, emphasis on light industries, inward orientation, capital-intensiveness, underutilised capacity, minimal linkage among the different sectors and a concentration in Addis Ababa (CIA World Fact book and the Library of Congress Country Studies 1991). According to Bekure Woldesemait (2005: 143), the most important industrial areas were concentrated around Addis Abeba, Dire Dawa, and Asmara (see Table 2-1).

Table 2-1: Regional distribution of manufacturing industry in 1970/71 in percent (Bekure Woldesemait 2004)

Category	Addis Abeba	Asmara	Dire Dawa	Other areas
Employees	51.0	28.3	11.6	9.1
Establishments	51.8	34.4	6.0	7.8
Gross value of Production	54.8	30.2	12.2	2.7

2.2.2 Developments during the *Derg* regime

After the revolution in 1974, rapid social and institutional changes happened in Ethiopia. The socialist government (known as the *Derg*[1]) implemented "a highly regulated and controlled economy, on the early Soviet model" (Krishnan et al. 1998), and nationalised land and major industrial, agricultural and service sector enterprises. Private initiatives were discouraged by extremely high income taxes of 89 percent on the income of unincorporated business (Tekola Dejene and Bakele Tamirat 1990). As a result, foreigners who had owned and operated industrial enterprises left the country. After nationalisation and also due to the war with Eritrea, labour strikes and demonstrations, around one third of the plants closed down. During the first years after the revolution manufacturing declined and private capital investment ceased. Only from the beginning of the 1980s the sector started to grow again. The private sector shrank, and the public sector became more important, particularly in terms of employment. In 1983, the public sector employed 73 percent of those in wage employment (Krishnan et al. 1998).

Towards the end of the 1980s the government decided to increase the role of the private sector to stimulate economic growth. The new policies planned to "remove all capital ceilings on private or joint-venture investment and [to] open most sectors of the economy to private sector participation" (DCA 1990: 3). However, the government could not implement the reform plans any more, because it was replaced in 1991.

1 Derg is the name of the socialist government ruling Ethiopia from 1974-1991

2.2.3 Liberalisation after 1991 and its effects

After 15 years under the *Derg* regime, the situation in Ethiopia was more than difficult. Tamrat Layne, the new Prime Minister described the situation as follows:

- "Due to the civil conflicts and wrong economic policies of the previous regime, the economy has collapsed;
- all productive sectors are in disarray in general and the agricultural sector in particular. Out of 150 industries, 40 have stopped functioning and the remaining ones operate at very low capacity due to shortage of foreign exchange;
- the civil conflicts of the last 17 years have misused human, financial and material resources of the country;
- the financial situation of the country, domestic and foreign exchange, are in the most disgraceful position;
- as a result, Ethiopia is the poorest country in the world" (Tamrat Layne 1991: 1)

To combat the economic crisis, the new government had to find a solution to keep the country moving. One possible response (and maybe the only one) to the situation was to ask international organisations for help. In fact, most sub-Saharan countries became dependent on foreign capital. In many cases this meant that countries got loans from the World Bank or the International Monetary Found (IMF), which were tied to conditions concerning the use of the money and/or changes in the countries' policy, the Structural Adjustment Programs (SAP).

Structural Adjustment Programs

While the measures differed from country to country, according to Riddell (1992) four main pillars of these so called Structural Adjustment Programs (SAP) can be observed:

Currency devaluation: As local purchasing power had been over-valued, currencies had to be devalued. Expected effects were a reduction of the local currency's value in terms of imported items, while export goods would become cheaper, which would be an advantage on the world market.

Removal of government involvement: The IMF supports the ideologies of the neo-classical economic school, and according to their view supply and demand regulate the market. Therefore, based on that ideology it was necessary to remove state interference so that the market forces could operate freely. While governmental interventions in the market through parastatal organisations and national development plans had been considerable, after the introduction of SAPs this was no longer possible. Parastatal enterprises were restructured and privatised.

Elimination of subsidies: In many African countries different goods, especially food and petroleum, had been highly subsidised before SAPs were introduced. As these measures destroyed market mechanisms, the IMF insisted on their removal.

Liberalisation of trade: Export production should be intensified and African countries reintegrated into the global economy. Protections of the local industries were removed because the IMF viewed these enterprises as over-priced producers (Riddell 1992).

Even though the World Bank's and the IMF's goal was to show heavily-indebted countries a way to a more successful economic development, today many scholars (e.g. Potts 1997, Osabu-Kle 2000, Krishnan et al. 1998, Calvès and Schoumaker 2004) agree that, as Riddell states, "[t]here can be little doubt that the effects of SAPs in Africa have led to worsened conditions" (Riddell 1992). They all describe that living standards declined, employment opportunities decreased, prices rose, infrastructure deteriorated and services reduced. For many people this changes meant that they suddenly found themselves living below the poverty line. The only positive effect stated is that in some countries the GDP per capita increased (e.g. in Ethiopia the growth rate of the GDP averaged seven percent between 1992 and 1997 (Krishnan et al. 1998)). Riddell suggests in his conclusion that "both the nature and attempted management of the debt crisis are causing profound, life-threatening changes which extend beyond the sphere of so-called 'experts'. (...) The fact is that too many members of that Washington-based organisation [IMF] are oblivious to the reality of Africa and its people – at least in terms of their actions, despite an obscuring rhetoric" (Riddell 1992).

For the industrial policy and also the service sector of Ethiopia this meant that only a very limited number of enterprises in the field of energy, large scale metal, chemicals and engineering industries stayed under public management. All other establishments were sold to the private sector, and government monopolies were broken. Profitability became the guiding criterion for running enterprises, and the role of private capital became important. The policy intended to attract foreign capital (Tamrat Layne 1991: 5).

In less formal words, structural adjustment meant that enterprises had to dismiss thousands of employees in order to become profitable. The number of jobs retrenched in the public sector after the implementation of the SAP accounted for 15 percent in Ethiopia (ILO-JASPA in Rogerson 1997: 345). The private sector on the other hand suffered mainly from two features resulting from SAPs: the decrease in demand, which was caused by increasing poverty, and the trade liberalisation, which made many previously protected enterprises uncompetitive (Potts 1997: 475). As the Birr was devalued, imports became more expensive and exports brought less income, which lead to big challenges for many companies. The result was not only that firms had to close down and thousands of (mostly urban) Ethiopians suddenly had no jobs any more, but as well that food and the daily life became more expensive, due to the removal of subsidies and the devaluation of the currency.

What can people do if there are not enough job opportunities in a city – neither in the public, nor in the private sector? They have to earn money to live anyways. Of course there are many different activities they can perform, like opening a petty trade, dressing other people's hair, producing and selling handicrafts, working in other people's houses,

or growing and selling vegetables, only to name a few. All those occupations usually have one thing in common: they are informal. As thousands of people lost their jobs in the aftermath of the implementation of SAPs, the informal sector grew significantly (Potts 1997: 474).

Informal Economy

To define informal economy is not that easy. The informal sector is usually seen as a large number of small-scale activities in production and service, which are carried out individually or in family-owned micro-enterprises, which are labour-intensive and use simple technology. Additionally, they are lying outside of state regulation (Todaro in Hodder 2000: 95).

The International Labour Organisation defines the informal sector as "very small scale units producing and distributing goods and services, and consisting largely of independent, self-employed producers in urban areas of developing countries, some of whom also employ family labour and/or a few hired workers or apprentices; which operate with very little capital or none at all; which utilise a low level of technology and skills; which operate at a low level of productivity, and which generally provide very low and irregular incomes and highly unstable employment to those who work in it" (ILO 1994 in Pick et al. 2002).

Further, the point that informal businesses are unincorporated enterprises is stressed, and that they therefore are not constituted as separate legal entities independently of their owners (ILO 2002). Or, as Castells and Portes describe it, the informal sector is "a process of income-generation characterised by one central feature: it is unregulated by the institutions of society, in a legal and social environment in which similar activities are regulated" (Castells and Portes in Pick et al. 2002). Lourenço-Lindell considers those activities as informal "that evade at least one aspect of state legislated regulations (such as lacking a license, evading the payment of taxes and fees or not complying with labour laws) or that are entirely regulated by rules other than legal ones enforceable by state institutions" (Lourenço-Lindell 2002: 21).

While often incomes of informal activities are at very low levels, it would be wrong to conflate informality with poverty. Income generated by informal activities ranges from very low levels to levels far greater than those generally obtained in the formal economy (Pick et al. 2002). However, the biggest part of informal workers are those poor people trying to earn enough money during the day to feed their family in the evening.

Even though the informal sector was growing rapidly during the last two decades, it is not a new phenomenon in African cities. However, according to Potts, "there is no doubt that the informal sector has become even more important in the era of debt crisis and structural adjustment because of the massive and precipitate decline in formal wages and the significant absolute fall in formal sector jobs in many African cities since the 1980s" (Potts 1997: 474). Already in 1986, the ILO estimated that

employment in the informal sector is around 60 to 70 percent of total employment in Nairobi, about 50 percent in Lagos, and 30 percent in Abidjan (Sreeramamurty in Pick et al. 2002). According to an estimate by Enterprise Surveys, the informal sector in Ethiopia accounts for 40.3 percent of the GDP (Enterprise Surveys 2006).

2.3 An idea to support further development

If in a place the economic development does not show any real progress, new ideas are very welcome. One idea to support development in Ethiopia is the development of information and communication technology (ICT). Even though during the 1990s a dramatic growth in information technology occurred, in 1999 there were no more than three telephone lines for 1000 people, one post office for 50'000 people, one newspaper for 1375 readers and one Internet link for 20'000 people (Adam 1999). Today, the government seems to have an ambitious project. With the support of different IT companies, the government of Ethiopia wants to connect 600 schools and 16'000 villages on broadband by 2007, with every citizen no more than five kilometres from an access point (Cisco Systems Inc. 2006). The idea is to accelerate the democratisation and the development of the country through this easier access to information. There are four critical areas of transformation: education, rural connectivity, capacity expansion, and e-government. The project leaders expect:

- the creation of jobs for the provision and the maintenance of the systems (including the education of specialists), and eventually even a development of a computer industry
- new opportunities for, and increasing productivity of farmers due to access to weather reports, agricultural best practices and market information
- more efficient government through better links between local and regional offices and the federal government headquarters through e-mail, Internet access, file-sharing and videoconferencing facilities
- access to Internet and TV based educational content, creating a foundation for e-learning (ibid.)

All in all, "Ethiopia's ultimate ambition is an end to poverty, using the national ICT platform to support better services, wider access to education, more productive farming, and a healthier population, pointing the way forward for other African countries" (ibid.) Or, as prime minister Meles Zenawi said: "Not long ago, many of us felt that we were too poor to seriously invest in information and communication technology. Now we believe that we are too poor not to invest as much as we can in ICT. We realise that while ICT may be a luxury for the rich, for us – the poor countries – it is a crucial weapon to fight poverty and thus ensure our survival" (cited in Cisco Systems Inc. 2006).

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3 History and culture of Ethiopia

Compiled by Lorenz Roten

Abstract

Ethiopia is hailed to be the origin of humankind. Its rulers descend from Minilik I, son of the biblical King Solomon. Ethiopia has seen powerful kingdoms, fierce battles, numerous invasions and charismatic fighters. What ranked once amongst world powers is now one of the poorest countries on earth. Yet it remains, thanks to its resistance, the only African nation never colonised. Ethiopia's last King, Hayle Selasse, has been overthrown by General Mengistu in 1977. The revolution in 1991 let to a theoretical democracy and a new constitution, guaranteeing equal rights to all 83 ethnic groups. Its largest are the Oromo, Amhara and Tigrayan.

3.1 Pre-historic period

3.1.1 Lucy

Of the prehistory of Ethiopia very little is known. One can only hope that archaeological work in this area will become more vigorous and extensive (Levine 2000: 26). There is a growing consensus among archaeologists and anthropologists that the human species originated in Ethiopia. For 20 years, the record for the oldest hominid was held by Lucy, a female that lived in what is now called the Awash Valley in Hadar some 3.5 – 3.6 million years ago (Natural History Museum of London 2005). When her bones were discovered in a dried up lake bed in 1974, Ethiopia is believed to be the first dwelling of mankind (Henze 2000: 1). But recent finds in Kenya, such as the discovery of Kenyanthropus platyops in 1998, have come to challenge Lucy as to who really is the direct ancestor of humankind. Research, resumed again after the Derg regime, brought to light bones of another 17 individuals at Aramis on the left bank of Awash. They appear more than a million years older than Lucy (ibid: 1).

Lucy's scientific name is Australopithecus afarensis. The first word means "Southern Ape" and the second word signifies she was discovered in the Afar region. Ethiopians refer to her as Dinkinish (Pankhurst 2001: 2). When she was discovered, only a little over half of her skeletons were found. She probably did not live more than 20 years and weighed around 60 pounds and stood three and a half feet tall (Burnstein 1998). Although you will be shown a well-done copy while the real Lucy is touring through

the United States (Hominidés 2006), Lucy is normally kept fully preserved at the national Museum in Addis Abeba.

Figure 3-1: Lucy, or Dinkinish (Amharic for wonderful): bones of the first know hominid that walked upright, discovered in the Awash area of south-east Ethiopia (Natural History Museum in London)

Figure 3-2: Australopithecus Afarensis, model of Lucy (American Museum of Natural History 2003)

The early inhabitants of Ethiopia during the Chalcolithic Age (6200-3000 BC) were in the beginning stages of domesticating grains such as Teff . Plough-based agriculture was also in the process of evolving, which could imply the domestication of cattle. Certainly by the Early Bronze Age (3000 BC), the domestication of animals, including cattle, sheep, goats, and donkeys was taking place.

Egypt is the source of the earliest written descriptions of the people residing in the area of today's Ethiopia and Eritrea. This area was known to the Egyptians as Punt, which sometimes they also called 'Gods' Land'.

Later we can read about an Ethiopian King in Greek mythology. In Homer's Iliad, King Memnon of Ethiopia leads an army of Elamites and Ethiopians to the assistance of King Priam in the Trojan War (Jackson 1983: 16).

3.1.2 King Solomon

Figure 3-3: The Queen of Sheba and her only son Minilik I (Budge 2000).

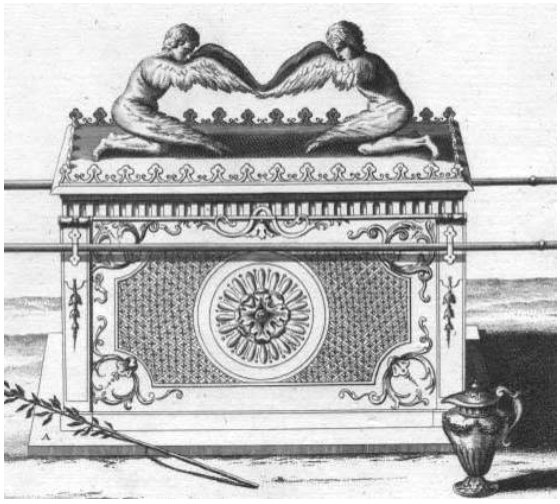

Figure 3-4: Just one of many different displays of how the Arc of the covenant, which supposedly contains the ten commandments of Moses and lays in Ethiopia, could have looked like (Physics Ohio-state 2007).

Although not written until the early medieval era, it is around the 8th century BC that mythical stories such as the affair of King Solomon with Makeda Queen of Sheba, and the coming of the Ark of the Covenant take place. Although the subject is controversial, in the Ethiopian constitution of 1955 it is officially claimed that the ruling line descend from their son, Minilik I. It is said that Queen Makeda (as the Queen of Sheba is also called) came unexpectedly to power over a small area in modern-day southern Eritrea (Marcus 2002: 17). Others come to the surprising conclusion that she was most probably a queen or princess of Egypt (Ellis 2003 :61). She made a long distance pilgrimage to Jerusalem to learn from the wise and beneficent rule of King Solomon. He agreed to cooperate, as long as she took nothing from his property. During her stay, the rich Queen endowed King Solomon with gifts, but he was so much entranced with her beauty and her fidelity, that he desired more. So one evening, he ordered his royal cooks to increase the amount of pepper in the meal and served plenty of wine but no water. When Queen Makeda awakened thirst driven, she grabbed the next water jug that Solomon placed around her bed, each labelled as his property. This allowed King Solomon to have the affair which led to the birth of King Minilik I. Could be an interesting origin of the saying „a kingdom for a glass of water“, or should we say „a king for a glass of water“. The legend further says that at young age, Minilik I returned to Jerusalem and stole the Arc of the Covenant, in which lies the Tablets of Law with the Ten Commandments inscribed on it. This fact was important to

arouse patriotic feelings of uniqueness. Later, it will give the „restored“ Solomonic dynasty the necessary basis for a renaissance in church and state (Marcus 2002: 18) (see subchapter 3.1 ‘The medieval period’).

3.2 Ancient history

3.2.1 The kingdom of Aksum – Ethiopia as a world power

The earliest records of Ethiopian constitutional history are from the Da’amat state located in northern Tigray and southern Eritrea and date back about half a millennium B.C (Nahum 1997: 4).

At around the time of Christ, in the highlands of Ethiopia and Eritrea arose a African civilisation originated from settlements of Sabean immigrants from South Arabia (Bekerie 1997: 35). The Kingdom of Aksumites will grow into one of the four most powerful kingdoms of ancient times, namely the Kingdom of Babylon and Persia, the Kingdom of Rome and the Kingdom of Chinese (Henze 2000: 22). It emerged as the mercantilist regional power to overshadow the kingdoms of Saba and Meroe on either side of the Red Sea. The Axumite empire traded far and wide and had close commercial and cultural contacts with the Greco-Roman world, Arabia, Persia and India (Nahum 1997: 4)

Figure 3-5: 5th century coin of King Ebana of Aksum (Bridgeman Art Library 2006)

At around 300 AD the Kingdom embraced Christianity. Therefore Axum is still considered to be the holiest city in Ethiopia and an important destination of pilgrimages. A significant religious festival is the T'imk'et Festival, known to us as the Epiphany, on January 19th.

Figure 3-6: The stele are the brandmark to the Aksumite kingdom as the Pyramids are to Egypt. Nobody has ever topped the height of stele of Aksum (Photo by Juliette Kaltenrieder, September 2006)

The decline of the Aksumite kingdoms was a long and slow process. The underlying cause was the shift of power southward. The Persians ended Ethiopian involvement in southern Arabia and the Islam replaced the Aksumites in the Red Sea, overpopulating and over-cropping the once fertile land. Forests were being cut down for construction and irregular rainfall eroded the soil. 600 years of intensive exploitation of the land had taken its toll (Henze 2000: 45) let the Aksumite agriculture collapse and made the power shift into southern regions necessary.

3.2.2 Zagwe Dynasty (1137 – 1270 AD)

The name Zagwe is an Ethiopian term of uncertain meaning, perhaps reflecting its Agew origins of the dynasty (Stuart 2002: 187).This period is one of the most obscure in Ethiopian history, for it left remarkably few records (Pankhurst 2001: 45).

Near the end of the tenth century, a Jeanne of Arc-like Agew leader called Yodit (Gudit or Judith) brought the thousand-year predominance of the Aksumite kingship to a conclusion as. she conquered their last king.

By this time, the nation of Aksum had seized to control the trade on sea in response to Islamic growth. The movement included the creation of military territories, which

contributed as a central part of the population from which Aksumite ways, Semitic dialect, and Christianity, diffused to the Agew peoples. In the long term, this movement can be viewed as a crucial advance in the melting together of Abyssinia and restoring Christianity.

Figure 3-7: Three Different views on one of Lalibelas eleven churches, the St.Giorgis church (UNESCO 2001; Doreau and Doreau 2001; Brigish 2001)

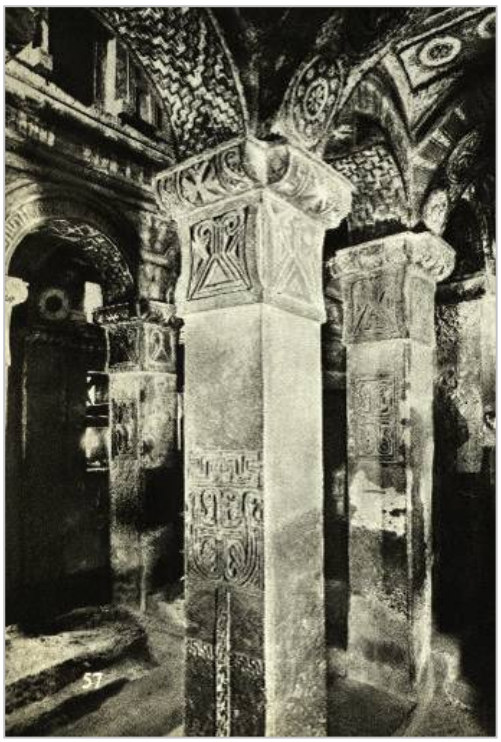

Figure 3-8: Inside Maryam Church, the one with the richest carved interior (Buxton 1970)

Figure 3-9: Another inside view into Lalibelas rock-hewn churches (Photo by Juliette Kaltenrieder, September 2006)

As mentioned above, there are very few records found, for that of the Zagwe dynasty did not produce coins or create inscriptions of any kind. But there was King Lalibela (1185-1225), the best known and most marvelled of all the Zagwe rulers. He is credited for building the eleven famous rock-hewn churches in his capital city named after him. Perhaps he was seeking to sacralise the new dynasty, but, if so, the attempt was ultimately a failure for the Zagwe dynasty was overthrown by an Amharic one that could lay claim to Solomonic descent (Isichei 1995: 47).

Lalibela's life is full of legends. It is traditionally claimed that upon his birth, he was surrounded by a cloud of bees. Hence, his mother gave him the name Lalibela, which means, "the bees recognises his sovereignty" (Pankhurst 2001: 48). Also according to legend, he was commanded by God "to build ten monolithic churches". It was an effort by the king to recreate Jerusalem, for it had been captured by Muslims and pilgrimage for Ethiopian Christians had become difficult (Henze 2000: 51).

3.3 The Medieval Period (1270 – 1632)

3.3.1 The restoration of the Solomonic line of power

The Zagwes were considered having taken possession of Ethiopia because they did not lay claim to King Solomon and the Queen of Sheba. Yet there is no denying that the Zagwe inherited, continued and developed their predecessors Christian traditions (Pankhurst 2001: 46). In 1270 it was from the region of Amhara that strong leadership finally emerged again with Emperor Yekuno Amlak, claiming descent from the Aksumite kings. The myths surrounding the „restored" Solomonic dynasty proofed very helpful for the following monarchs (Marcus 2002: 19).

Two significant differences between medieval and earlier times are the end of coinage for one. Trade was now based on primitive money like bars of salt, cloths or iron. The second difference was that stationary capitals, such as Aksum or Lalibela, were things of the past. They had been replaced by one of the most characteristic features of the medieval period: moving capitals, which were often no more than temporary military camps (Pankhurst 2001: 61).

The monarchs had immense power. They could appoint ministers and take land at will. Local governors camped for months close to the king, waiting permission to speak to them. They had to humble themselves, first entering half naked until their allowed to come with clothes and pomp. Despite all its immense power, the monarchy suffered from major weakness in connection with the succession. Until 1508, every emperor had five or six wives. In consequence, the royal inheritance was often very uncertain. Besides primogeniture, it was also friendship, supporters and wealth that determined the next monarch. Still, the Solomonic line stayed in power until 1974, when the military Derg regime took over from Hayle Selasse (Pankhurst 2001: 64).

3.3.2 Muslim invasion

Since Zagwean times, Muslim leaders had sought to unite their jurisdictions into one large and powerful state to struggle for souls, terrain and trade (Marcus 2002: 30).

The Muslim explosion into the Christian kingdom had been long in the making. Strife between the cross and the crescent provided the ideological justification, and Ethiopia's maladministered and exploited periphery furnished the battlegrounds. For several centuries, Ethiopia's mostly non-Christian nomads had sought to quit their lowlands and deserts for the high plateaus. There the herders found more and better territory for

their cattle, but mostly have been thrown back and savaged by Christian armies. But overpopulation and overgrazing in the Somali and Afar region eventually had to lead to population movement to the Awash plains and Harer uplands, which fell in anarchy. When trade declined, the people called out for new leadership (Marcus 2002: 31).

This was the time of Ahmad Gragn. Ahmad Ibn Ibrahim, called Gragn, the „left-handed“, was a charismatic leader with immense personal gifts (Crummey 2000: 52). He declared a jihad and began a great Muslim invasion in 1527. He was the nightmare of Christian Ethiopia and sought to impose Islamic Puritanism (Marcus 2002: 31).

Since the fall of the Roman Empire, Ethiopia had enjoyed immunity from political and military pressure from Mediterranean powers. But now there were two Powers in the region, the Portuguese and the Ottamans which wanted to establish themselves (Henze 2001: 86). They intervened greatly in the war, equally as disruptive of the Solomonic polity and its balance of church and state as the jihad and the Oromo (Crummey 2000: 53). Only with help of 400 Portuguese troops, led by Vasco da Gamas son, Christovao, could Gran's invasion be stopped in 1542. But this provoked the Turkish to send 700 troops to Gragn's help and ended in the beheading of Christovao. One year later, the outnumbered Ethiopian and Portuguese army managed to kill Ahmad Gragn in battle, letting his headless army to flee (Henze 2001: 86).

After 14 years of warfare, the Ethiopians were dully wounded. The Muslims didn't re-establish a new resurgence large enough to threaten the Ethiopian empire and the Christian empire was once again restored (Crummey 2000: 52, 53).

3.4 The Gonder period – order and disorder (1632 – 1769)

During the Gonder period, Ethiopia gradually lost its territorial unit. Rival princes rivalled for supremacy and the Oromo tribes poured in over the frontiers. It is a period of decadence with a certain charm of its own that is apparent in the palaces that have since fallen into decay (Tadesse Delessa and Girma Alemayehu: 99). But first the historic importance of Gonder lay largely in its relative permanence, which contrasted with the transient character of the instant capitals of earlier times. Enduring from one reign to the next, the city was constantly increasing in both size and population (Pankhurst 2001: 110).

In 1520, Gonder was little more than a small village. By 1630 it possessed not only the thrown of the ruling family in Abyssinia, but also the renaissance culture of the liturgy and artistry, which is recognised as the beginning of its modern form in Ethiopia and was a great religious centre. It controlled a route to the regions south of the Blue Nile and to the then northern and western trade routes. The creation of Gonder is credited to Fasiladas the Great (1632-67) building the first of the castle-palaces, for which the city is famous today. Gonder became capital and unlike earlier times, it did not move. It was then when a long, slow process of growth and contraction, of revival and setback

began. Ethiopia abruptly ended most relations with Europe for two generations time (Crummey 2000: 73).

Figure 3-10: Gonder castle (Photo by Eduardo Ronc, 13 September 2006)

In 1769 King Yoas was murdered by his son and the credit of the monarchy itself declined, as people did not accept this crime. Soon afterwards the empire began to break up as territorial governors refused to obey the king. As a result the country became a prey to intrigues, rebellions and civil war (Crummey 2000: 73).

3.5 Zemene Mesafint – Era of Princes (1769 – 1855)

Zemene Mesafint was the period, when the regional rulers held the real power in the country and the king of kings in Gonder became but a puppet (Tadesse Delessa and Girma Alemayehu: 110). The lords usually came from families whose inherited claims to power lay at the sub regional level. For example, rule in Tigray was contested between lineages of three sub provinces. National and regional rivalries were played out on the battlefield and armies seemed to be ceaselessly on the march (Crummey 2002: 145).

Understandable, that this way Ethiopia of 1800 was a weak state with serious internal problems and little visible cohesion. It was not, however, like many other areas of Africa, the home of a mere conglomeration of tribes. The many centuries of settled agricultural life in the Ethiopian highlands, the long history of the monarchy and the Christian Church had weakened tribal structures in favour of a more regionally organised society (Henze 2000: 119).

This setting made it possible that the short period of Zemene Mesafint has seen 28 reigns. But none of them leaders tried to separate from Ethiopia. The idea of the Ethiopian Empire remained intact with its traditions of faithfulness to Christianity and

the legacy of Aksum, even during the second phase when Solomonids were radically marginalised (Crummey 2002: 145).

Then Europeans developed a greater curiosity about Ethiopia than ever before. Explorers, missionaries and traders visited the country with increasing frequency. Trade rejuvenated and tribal lords gained more access to firearms. In the north, Tigraen rulers were able to get hold of guns from the Turks by means of two-way transactions and used them to seize power. Europeans of many trades and professions visited the kingdom with more regularity. Missionaries sponsored by the Swiss, German, and English governments attempted to convert Ethiopians to Protestantism. Most Ethiopian rulers were more concerned with the prospective support and firearms the country would receive rather than the missionaries' religious messages. The missionaries' attempts failed but they did bring awareness of the potential of technological advancement (Henze 2000: 125).

Luckily, during this time of internal disarray, Ethiopia was still outside the range of sustained expansionist interest of colonial powers. It was actually now that a basis was laid for the survival of Ethiopian independence, as the most important regions gained steadily in strength after the collapse of the Gonderine monarchy (Henze 2000: 120). Those regions were Amhara, Shoa, and Tigray. The Amhara region was continually in internal fraction and contributed poorly to defending Ethiopia against external enemies. Tigray, on the other hand, played a major role in reinstating an imperial government and hosted a decisive battle at Adwa. And Shoa, for the most part, stayed out of the political situations that dealt with the Amhara and Tigray regions. However, Shoan kings did expand their territories southwards and established trade that produce an abundance of coffee and slaves. Ethiopia survived this era in its history because of Tigray and Shoa's gaining steady power (Henze 2000: 121).

The era ended in 1855, when one of the lords succeeded over the others making himself Emperor Tewodros II and initiating the modern history of Ethiopia (Henze 2000: 121).

3.6 Modern history (1855 – 1974)

The following chapter is based on the book „Ethiopian history", edited by Tadesse Delessa, Girma Alemayehu (118-181), bought in the streets of Gonder in September 2006. Initially put together for high-school and first-year college students, the book is „recommended for a reference, revision and background reading" as stated on the print itself. In addition to European authors already known and used by us, like Stuart, Marcus, it is the grand number of Ethiopian authors that probably add a special flavour to this book for a real reading experience. Unbiased and detailed it draws you back in time, giving a special inside perspective. If not otherwise cited, following chapters information is a sum up of the respective chapters in the book of Tadesse and Girma (year unknown).

3.6.1 Tewodros II, from victory to disaster (1855 - 1868)

Tewodros somehow is the Che Guevara, Robin Hood and Garibaldi of Ethiopia. In mid twentieth century, he became the most popular of all Ethiopian rulers. Young Ethiopians see in him the bringer of modernism. With him began the reunification of Ethiopia. Charismatic, Idealist and somehow brilliant (Henze 2000: 133), he lived a life as a bandit defeated one Zemene Mesafint leader after another. The population longed for a leader who would bring peace. His coronation to Tewodros II, king of kings of Ethiopia signified the end of the Zemene Mesafint and the beginning of the Modern history of Ethiopia.

He attempted to abolish the feudal system, to modernise the country and initiated a number of reforms. But he didn't succeed, as his administrative policy was characterised by inconsistency. He abolished slavery though and tried to make close ties with Europe. He gave Europeans a friendly reception but had in return counted on technical assistance and diplomatic support for his conflict with Turkey and Egypt. This did not happen and he began to mistrust especially England. When he imprisoned an English consul England sent 32'000 men to liberate the prisoners. His army was defeated, he released the prisoners unharmed and committed suicide, admitting complete failure (Henze 2000: 133). The British withdrew again completely in 1968 (Tadesse Delessa and Girma Alemayehu: 118-128).

Figure 3-11: You can find pictures of Emperor Tewodros II on clothes, shirts, calendars (Photo by Lorenz Roten, 11 September 2006)

Figure 3-12: Wall painting of Tewodros II at Desse (Photo by Eduardo Ronc, 11 September 2006)

3.6.2 Yohannis IV (1872 - 1989)

Following the death of Tewodros, three powerful lords emerged as contender to the throne. One of them collaborated with the British against Tewodros and was rewarded with modern arms, giving him superiority above the others. He won over his rivals and

was crowned at Axum as Emperor Yohannis IV. He ruled Ethiopia under great difficulties as he battled the Egyptians from the north, the Italian from the east, Mahdst Muslims from the west and Minilik from the south and spent most of his reign establishing and preserving his kingdom.

His approach towards unification was quite different from that of Tewodros. Realising the deep roots of Zemene Mesafint, he was ready to allow a lot of local freedom to the regional lords as long as they acknowledged his over lordship.

When Swiss-born Werner Munziger was appointed as Egyptian governor of Massa, he used a false pretext to occupy Bogos. Yohannis IV was still busy consolidating his power within the country. He sent out for help in Europe, but for these countries Egypt was a more valuable trade partner. Once established in Bogos, the Egyptians were getting ready to realise their plan of the total annexation of Ethiopia. After having taken Harar in 1875, Munziger pushed inland, but he and his army were destroyed by the Afar. Still hoping for European diplomatic intervention, Yohannis IV waited with mobilising his army and completely destroy the better equipped, but far outnumbered Egyptians. Their response was a second, better prepared expedition, which was again defeated. Yohannis IV did not try to completely throw out the Egyptians, but wrote letters to Queen Victoria in search for a lasting peace. It will take almost another decade to find it with Egypt, rescuing a trapped garrison. As a response two other, even stronger adversaries took Egypt's place.

For one the Italians. With their deeply nationalistic and paranoid prime minister, who believed that Italy's newly won national unity required the grandeur of a second Roman empire, was eager to finally annex colonies. And only independent Ethiopia offered the possibility (Marcus 2002: 92). They did not follow Yohannis IV request to leave his land. This led to the famous battle of Dogali, in which almost the entire Italian force was wiped out.

The dutiful rescue of the Egypt garrison caused immediate Ethio-Mahadist hostility. They sacked and burned Gonder. Thousands of Christians were captured and enslaved. Yohannis warned them to strike back. He defeated the Mahadists army but victory turned into defeat when he was mortally wounded during the fight. He took three bullets and died the next morning. Later his body was captured by a Mahdist detachment. They killed the nobles and priests accompanying him (Henze 2000: 160), beheaded the corpse and sent his head sent to the Khalif (Tadesse Delessa and Girma Alemayehu: 130-148).

3.6.3 Minilik II (1889 – 1913)

When news of the death of Yohannis IV reached Minilik II, he immediately proclaimed himself king of kings. He did not really have much competition. The imperial army had disintegrated as it marched mournfully home after the death of Yohannis IV. In order to discourage other imperial pretensions, Minilik II decided to negotiate with Italy. They

started as very good friends, but ended up as bitter enemies, being engaged in one of the bloodiest clashes that took place in the African continent in these times.

Figure 3-13: Emperor Yohannis IV (The Imperial Ethiopian College of Heraldry of the Solomonic Crown)

Figure 3-14: Dogali-Obelisk in Rome. Arriving in Rome by train and leaving Termini Station, you immediately stand on Piazza del Cinquecento, remembering the 548 fallen Italian Soldiers. The obelisk has been moved around the corner (Martin Knopp 2005)

Following the Italian defeat at Dogali, Minilik II had concluded a treaty with Italy, where he promised neutrality in the war against Yohannis IV in exchange for 5000 rifles. As he feared attacks from Yohannis IV, he sought further collaboration. Once emperor, his collaboration with the Italians had already a history of almost a decade and a half (Henze 2000: 160). With Italy he signed the treaty of Wuchale, whose 12th Article differed in the two versions. While the Amharic text said that Ethiopia might use the good offices of Italy in foreign affairs, the Italian version bound Minilik II to do so, thereby reducing Ethiopia to the status of an Italian protectorate. With exception of Russia and France, most of the powers accepted Italy's claim.

After being crowned Emperor at the Church of Mary on Mount Entoto in 1889, still not aware of this discrepancy, he wrote to several countries without using Italy as an intermediary. This was the first step towards the disastrous battle of Adwa.

Of course Minilik II could not accept these terms, and when he announced that the treaty would cease in 1994, the Italians saw no other than the military option. Ethiopia was in no condition to sustain a war. In 1988 struck a terrible cattle plague (triggered

by Italian importation of infected cattle), killing more than ninety percent of the livestock, including the for farming so important oxen. Also, the Ethiopians were struck with a particularly virulent cholera. As if this was not enough, the following years up to 1892, the Ethiopians passed through the worst famine of their recorded history.

In 1895 Minilik II had to mobilise the army. He brought up some 100'000 men against 30'000 Italians. Nevertheless he was looking for a peaceful agreement. Blinded by cultural arrogance, racism and underestimation of the ability for Ethiopians to unite, Italy demanded humiliating terms impossible for Minilik to accept.

Italy was defeated by Amba Alage and then completely sealed off at Mekele. Those Italian troops were saved from complete annihilation only by the decision of the Ethiopians to let them go. The Italians could do so with all their weapons and were even provided with pack animals. It shows Miniliks hope for a peaceful resolution.

The two armies final encounter happened at Adwa. As Minilik wanted to lure Baratieri, the Italian commander, into open combat, Baratieri did not want to leave his fort. Based on false information, a faulty map, underestimation of the Ethiopian forces and great pressure from Rome, Baratieri took the fatal decision to attack. One day later, the Italian army was destroyed.

Besides the important new peace treaty, Ethiopia received respect from all other African countries. Minilik II accomplished the dreams of Tewodros II, restoring black pride and making of Ethiopia a symbol of independence and dignity. This victory stimulated the energies of South African blacks and for many secular leaders of colonial Africa, the image of independent Ethiopia was a powerful beacon and frequent source of inspiration (Levine 2000: 13).

As a consequence of his high external prestige, many foreigners came to Ethiopia. And Minilik II seemed to have a strong desire to introduce western science and technology into the empire. He was highly intelligent and curious about everything. This permitted him to introduce a postal system, telephone and telegraphic services, a railway line, a bank, modern schools and hospitals, a government printing press, hotels, sewing machines and a cinema under his reign.

After his first stroke, Minilik II began to prepare a smooth succession after him in two ways. He announced the formation of „European Style“ cabinets. It seemed more designed to impress European observers than to introduce ministerial powers though. And he designated his grandson as a legal successor to the throne (Tadesse Delessa and Girma Alemayehu: 148-181).

Figure 3-15: Emperor Minilik II moved Ethiopia's capital to Addis Ababa to gain control of southern Ethiopia (Pankhurst 2001)

Figure 3-16: Emperor Miniliks II Palace on Mount Entoto above Addis Abeba, praised by Ethiopians as architectural masterpiece, designed by Minilik himself. Remarkable: It is built out of wood and mud and even though it has never been renovated, it is still in perfect condition and has been guarded always (Photo by Lorenz Roten, 5 September 2006)

But Miniliks II wife, Empress Taytu, did not particularly like this plan. Seeking control of diplomatic relations and with a very skilful policy of marriage alliances, she was able to enhance her power. This provoked fierce resentment among the nobility and finally had to cede to Minilik's daughter, Empress Zawditu (1916 –1930) (Marcus 2002: 117).

3.6.4 Hayle Selasse (1930 – 1974)

Ethiopia under Hayle Selasse was a very poor country. There were grave problems, becoming more apparent as the reign continued. Agricultural productivity was diminishing year by year; drought and consequent famine existed in several regions. The imperial government was authoritarian and unyielding to change. Even though the emperor had once seemed to foreigners a leader open to reform and progress, and modernisation had continued, this was within the limits of his personal judgment of the country's capacity for acceptance (Stuart 2002: 2).

When he took his baptismal name Hayle Selasse (Power of the Trinity) for his reign and adapted his personality to conform to his great new status, he attributed his success to destiny. His metier was power (Marcus 2002: 130). In 1931, Hayle Selasse decreed the nation's first written constitution and through his efforts, Ethiopia became a member of the United Nations in 1932. A more detailed and differentiated view about Hayle Selasse and the following brutal Derg regime, whose General Mengistu Haylemariam is now currently facing the death penalty (Henshaw 2007), can be read in Andreas Obrechts chapter 14 of this compilation.

Figure 3-17: Hayle Selasse graced twice the cover of TIME Newsmagazine. Once on the edition of November 3rd, 1930 (Vol. XVI No.18) and once on January 6th 1936 (Vol. XXVII No.1). In the latter he is celebrated as the man of the year, elected by the Newsmagazine's TIME jury (TIME Online Archive 2006).

3.7 Culture

3.7.1 Introduction

Talking about Ethiopian Culture is not an easy task. And a university trip of three short weeks doesn't facilitate this endeavour – in the opposite. The knowledge of so many different ethnics with their own languages, own customs and rituals, let this country break up before your inner eye in a colourful cultural patchwork. Overwhelmed by the many faces, you realise the responsibility to treat and write equally about all of them is impossible and far out of the author's understanding and experience of the Ethiopian culture. Instead we will pick some interesting topics and write down some experiences during our trip, gathering scientific and personal data as it was told and understood, not claiming or guaranteeing any accuracy or entity. But first we hint at a basic problem when we talk about Ethiopian culture – what really is part of it?

Under Yohannis IV and Minilik II the territory subject to the Ethiopian government has tripled, adding dozens of tribes and millions of people to the empire. These conquests have been judged beneficial, for it greatly reduced the intertribal warfare and paved the way for abolition of slavery trade in Ethiopia. Even so, the question can be asked whether this imperial expansion was basically a subjugation of alien peoples or an ingathering of peoples with deep historical affinities. Especially since many of the conquered peoples still appear to chafe under the dominion of the Ethiopian state (Levine 2000: 26)

The prevailing view has been that, for better and worse, the Ethiopian Empire of the twentieth century consist of a number of previously autonomous and distinct „African" tribes, subordinated under an alien Semitic minority.

A different view is obtained however, if one's perspective begins not three but six thousand years ago: not in Arabia, but in Africa; not with the Semitic importations but with the Ethiopian peoples at home. Such a view may justify replacing, or at least correcting, the image of an arbitrary empire composed of numerous isolated and vastly diverse subject peoples with the image of a vast ecological area and historical arena in which similar peoples have shared many traditions and interacted with one another for millennia. The present boundaries of the Ethiopian state roughly circumscribe the area in question (ibid: 27).

3.7.2 Peoples

There are more than 80 different ethnic groups within Ethiopia. Some of these have as few as 10,000 members. But three, the Oromo, Amhara and Tigrayans make up more than three-fourths of the population.

The very largest ethnical group, the Oromo people, make up to 54 percent. They are Muslims, Christians and Animists, and are known for their egalitarian society. Originated from the south of Ethiopia and Kenya, they were nomads and warrior horsemen. Today, most are farmers or cattle breeders.

The politically and culturally dominant ethnic group are the Amhara. They are located primarily in the central highland plateau of Ethiopia and cultivate teff, used to make injera. Though their life is hard, the Amhara are proud people, proud of their ethnicity, their religion, their special place in the world.

Other peoples are: The Gurage, descendents of military colonists living in the north. Harari people, which lived close to Harar and are known as good craftspeople. Furthermore you will find the strongly hierarchical Somali in the south-east, the Afar, which live in the very unfertile region of Dankalia and the animist Sidama people which believe in reincarnation in the south-west (Gordon 2000).

3.7.3 Amhara – Oromo differences

The Oromo are in many ways the antithesis of the Amhara. Not only did the two people confront one another for centuries but also their traditions contrast radically. Where the Amhara system is hierarchical, the Oromo is egalitarian. Where the Amhara is individualistic, the Oromo is solidaristic. Where religious and political functions are segregated in Amhara institutions, for the Oromo they are fused. Where the Amhara historical project is to build an empire, that of the Oromo is to maintain a simple tradition.

Unlike the Amhara household, the Oromo household rarely contains members who are not spouses or immediate kin, forming a small, nuclear family unit. The Oromo are polygamous, the number of wives in a family depending on a man's wealth. They also practice the levirate: when a man dies, his wives are inherited by his oldest living brother. The husband moves around the different houses staying most of the time with his favourite wife (Levine 2000: 129).

Yet, the Oromo family is much more stable than the Amhara family. While many, if not most, Amhara marriages end in divorce, the Oromo have no laws or procedures that permit divorce. In Amhara families, relations between spouses and between parents and children are relatively tense whereas in Oromo families relations are relatively spontaneous, emotionally expressive and good-humoured. Oromo women have the exclusive right to build huts, making men particularly dependent upon having a wife (Levine 2000: 130).

3.7.4 Kinship

The Amhara rule of exogamy stipulates that marriage partners must not be closer than „seven houses"; that is, spouses must not have a common great-great-great-grandparent. A basic knowledge of the family's genealogy is thus essential. Amhara custom also enjoins relatives to avenge the murder of a kinsman, though this is usually observed only by fairly close in. What is most important for the Amhara, however, is that kin relations determine the distribution of tights to the use of land. Rights to plough plots of land and potential rights to additional plots are obtainable in traditional Amhara areas only through inheritance. Since the Amhara descent system is ambilieal, these rights are inherited bilaterally – by sons and daughters equally, and through both parents (Levine 2000: 116)

3.7.5 Languages

The analysis of linguistic distributions suggests that the proto-Ethiopians of the third millennium B.C. spoke languages derived from a single stock, known as Afro-Asiatic. This ancestral language probably originated in the eastern Sahara. Afro-Asiatic was the ancestor of six major language families: Ancient Egyptian, Berber, Chadic, Semitic and Cushitic and Omotic. The latter three have been spoken by proto-Ethiopians. These, by 2000 B.C. were beginning to separate into groups with different languages and

cultures, a process accelerated in recent times by the impact of external forces (Levine 2000: 28)

Now an astonishing 83 different languages are spoken in Ethiopia. There are 200 different dialects. The Semitic language of Ethiopia are related to both Hebrew and Arabic, and derive from Ge'ez, the ecclesiastical language. Ge'ez is one of the most ancient languages in the world and is still used today by the Ethiopian Orthodox Tewahedo Church. It is to Ethiopia as Latin is to the west. Ge'ez was not used as a spoken language for a very long time. But like Latin, Ge'ez is the precursor of Ethiopia's three major Semitic languages: "In order to convey an idea of the relationship of Amharic, Tigrinya and Tigré towards each other and towards Ge'ez, we might enlist the helpful parallel of the Romance languages. If Ge'ez is compared to Latin, Tigrinya takes the place of Italian ... Tigré would then be likened to Spanish and Amharic to French (Edward Ullendorff 1965 in Buxton 1970: 31)".

3.7.6 University

Figure 3-18: What is now the University of Addis Abeba used to be the palace of Hayle Selasse. On this place happened massacres under Italian rule. The stairs are a popular for students to take a picture on after graduating. But they originate from fascist rule – every step for a year under fascist power (Photo by Eduardo Ronc, 5 September 2006)

Schooling is greatly expanding in Ethiopia. Just four years ago, only the best 5000 candidates of a nationwide test have been allowed to enter a University. A great endeavour that allowed only few outstanding to get a study place. Not of your choice, clearly stated. The major will be assigned to the students by the state. Ten different studies can be put in order of preference, but rarely student and major find themselves. For instance, few of our estimated study colleagues wanted to study geography in the

first place. Now many new universities are being built throughout the country, easing the desolate conditions by increasing the number of possible students and the less stretched distances (own communication during study tour).

3.7.7 AIDS

Let us not beat around the bush and follow the Ethiopian example – let's talk about AIDS. As much it is a problem as anywhere else, here in Ethiopia the topic is addressed, discussed and talked about in a very direct way. This is not self-evident, finding HIV positive persons in Switzerland more marginalised. Allegedly, young people in Ethiopia now clearly communicate with self-confidence and responsibility if they suffer from the disease, even towards new acquaintances in bars.

Figure 3-19: Anti AIDS campaign in Harer (Photo by Lorenz Roten, 25 September 2006)

Greatly pushed ahead was this frank and open vision in the last years by a popular radio broadcasts hosted by a well known and much loved AIDS sufferer. It provided the platform to include everybody, catch attention and bring over a message - self-responsibilty.

An AIDS test is free of charge and can be taken all the time. Hospitals used to issue an attest so one can proof it's health for marriage or partner. They rethink this practice as it has been seen as a ticket for free love.

3.7.8 Literature

The earliest extant literary works in Ge'ez are translations of Christian religious writings from Greek. From the 7th century to the 13th, a period marked by political disturbances, there was no new literary activity; but, with the proclamation of the new Solomonid dynasty in Ethiopia in 1270, there began the most productive era of Ge'ez literature. During the Muslim incursion of 1527–43, Ethiopian literary activity ceased and many manuscripts were destroyed; Islamisation was widespread, and, even after the repulsion of the invaders, the country never fully recovered. The ancient language of Ge'ez had by now lost its vigour and became a liturgical language in which few people were thoroughly conversant. During the 16th century, Amharic, the principal spoken language, was beginning to be used for literary purposes. The earliest known Amharic compositions are songs celebrating the victory of Amda Tseyon (1314–44). From the 16th century onward, theological works were produced. The first official chronicles wholly in Amharic were those of Tewodros II (1855–68). With the restoration of Ethiopian independence after the Italian occupation of 1936–41, Emperor Hayle Selasse strongly encouraged authors to produce many types of books, especially on moral and patriotic themes. Writers of merit during this period were Makonnen Endalkachew (who produced allegorical novels and plays), Kebede Mikael (verse dramas, some history and biography), and Tekle Tsodeq Makuria (histories) (Ullendorf 1965).

3.7.9 Music

Again, the great number of tribes create a grand diversity of sounds and music. Some forms of tribal music are strongly influenced by Muslim and folk music from elsewhere in the Horn of Africa, especially Somalia. Ethiopia is a musically traditional country. Folk instruments include masenqo (fiddle), washint (flute), kebero (percussion), krar (lyre), and begena (large lyre).

Having said this, what you will really hear in every cab in Addis Abeba are the reggae tunes of Teddy Afro, the catchy oriental melodies of Ephrem, the light sweetness of Yasteryal and, of course, Aster Fequere and Zeritu, a mix of Katie Melua, Norah Jones and Mariah Carey. They are at the moment very popular. But when the TV sends pictures of the winner of the Ethiopian Music Star, you really catch the attention of the people (own observation).

Normally also that the most famous Ethiopian pop singers have huge followings. Compared to American music Mohammud Ahmed would take the part of Sinatra and Tilahun Gessesse the place of Julio Iglesias. Currently the most prominent Ethiopian singer internationally is Gigi. Through her performing with top jazz musicians like Herbie Hancock, Gigi has brought Ethiopian music to popular attention, especially in the United States, where she now lives.

3.7.10 Food

The Ethiopian national dish is called wat. It is a hot spicy stew accompanied by injera a traditional large sourdough crêpe made of teff flour and water. Teff so far has been unique to the country and was grown only on the Ethiopian highlands. Just recently this resistant and easily digestible grass has been exported to the Netherlands and Germany, where they try to grow it with some problems. For example is the grain to hard for the usual grain mills. It takes three days for the injera pasta to find its final consistence.

There are many varieties of wat. Doro wat (the chicken dish), Shero wat (dry peas bowl), beef , lamb, vegetables and lentils. Wat is served by placing it on top of the injera which is served in a mesob (large basket tray). The food is eaten with fingers by off a piece of injera and dipping it in the wat. At the end always leave a bite in the tearing dish, this is a compliment showing that enough food was served. Feeding his friend is a demonstration of respect.

3.7.11 Drink

Coffee is not only produced, but also greatly consumed in Ethiopia. Especially the festive and social note around preparing and drinking bunna makes this drink probably the favourite one of many Ethiopians. During „coffee ceremony“ the still green beans are roasted , ground and served in a Jebena (coffee pot) with boiling water. When ready it is then served to people in little cups, up to three times per ceremony, together with popcorn. The grass on the floor is a natural and festive decoration and also used in other occasions.

Another locally produced traditional beverage that is often drunk in bars and restaurants is Tej, honey beer.

3.7.12 Costume

Very popular to both Ethiopian men and women is to wear a traditional costume called Gabbi. It is basically a large, white cotton blanket that is thrown around the shoulders. More often than not it can be seen on Sunday mornings, when people are going to church. Gabbis change greatly in size and ornaments, prices and quality. Other ethnic groups and tribes in the south and west of the country wear different costumes that reflect their own traditions. Some tribes partially cover their body with leather but others do not wear any clothes at all, merely decorating their faces and bodies with distinctive images.

Figure 3-20: Before it can be worn, the Gabbi has to be sewn according to your preferences (Photo by Lorenz Roten, 21 September 2006)

3.7.13 Red Mistake

Even though despised by many travellers to go to movie theatres in other countries, it turned out especially in Ethiopia to be an unforgettably eye-opening experience, catapulting you to the very heart of the suffering, hopes and fears of a whole people, releasing you into the dark streets of Addis Abeba with goose bumps and another understanding of lived history. For a short time you become partly Ethiopian, just sensing what more there could be. A highlight for sensitive people in the right mood – The author talks about his personal movie experience seeing the movie Red Mistake shown in the Addis Abeba movie theatre in September 2006, for the Ethiopian movie industry produces more movies than the Swiss one. There are in Addis Abeba theatres which show exclusively Ethiopian footage

Freshly arrived in Ethiopia and soberly, one-dimensionally contemplated, we would named it nothing else but a bad movie of terrible quality, shown in a under equipped theatre. Not knowing how to deal with the content, like an Ethiopian at a Polo Hofer Concert, we would just credit the surprisingly disciplined, one-lined waiting queue, stare fearfully at the horrorifying letters of the Red Mistake movie poster and patiently pass the severe check for cameras. In the over dimensional movie theatre a beamer has been installed on a table in the middle aisle.

Red Mistake is a film about a man in the Mengistu regime, a contribution for the national processing of the past. We heard and read about it, but we had no idea how deep and present this rage and fear still is inside the people, waiting just underneath the skin to come out. The movies is such a place.

Basically the hero is smart, well educated, caring and innocent man. In the movie he does not seem to feel pain, get old or tired of being beaten. He tries to talk his rebellious brother out of opposing to the Derg regime and wants nothing but peace. They are picked up, tortured and his brother shot dead. He manages to escape, giving

the Derg a reason to kill his wife. With his daughter he starts a new life in the country side, but finds only peace after having killed the General in person with help of people who finally had enough and rise up. And in the final scene he comes together with the two women he loved.

Is this too much? Should we feel embarrassed watching such a movie? First, as a Swiss observer I was. The hero is a superhuman, humble and disrespected for taking care of his son, but well-humoured, highly educated and always managing to get through the most difficult times with smile and breadth of vision. And he finishes his life in peace.

But then the unique experience really starts. All around you, young and old turn into children. Each time the hero escapes, no matter how impossible, there was clapping, relieving breaths, cheering and standing up. The audience tried in genuine horror to warn the wife when the Generals half-brother entered the room. With huge eyes they watched the torture and killing. With ardent fever and closed fists they underlined the heroes speech to not any longer tolerate injustice. They felt with the movie, as if their life depended on it. Somehow it did, it is their life, their fate. The setting is nor fiction nor far away. The terror, the fear, the rage and the constant fight for survival of the poorest of the poor brought to life and intensified all around you - it really rubbs off . What could we possibly counter? Moorgarten?

Finally seeing these emotions not violently expressed but relativated in an inborn mix of timidity and reticence, leaving the good feeling of probably having done a step towards real understanding. One that cannot be taught, only experienced. Thank you Ethiopia!

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4 Urbanisation and transport network in Ethiopia

Compiled by Michael Rüegsegger with feedback from Alemayehu Assefa

Abstract

Ethiopia is still an under urbanised country. The urbanisation is a recent phenomenon, which began with the establishment of Addis Abeba as the new capital. Since then, the urban development experienced a rapid increase compared to the African average. Ethiopia's urban population reached 16 percent in 2005.

The transport network is also underdeveloped, even tough the state realised its necessity for the national development. With foreign aid Ethiopia is currently improving its road network.

4.1 Urbanisation

4.1.1 Historical background

During the Aksumite period, when the Ethiopian civilisation was at its zenith, a number of towns and ports reached a level, when commerce was flourishing and a very high standard in building and construction was achieved. Aksum was known as a great city and the powerful capital of an extensive empire dominating the vital seaborne trade between Africa and Asia. The kingdom numbered among the greatest states of the ancient world. The relatively decline and disappearance of Aksum is by now still a mystery, though many explanations have been offered since (Mesfin Wolde-Mariam 1972: 185).

In the 12th and 13th century, Lalibela had a short period of urban civilisation. The city was initially known as Roha and used to be the capital of the Zagwe dynasty.

Several centuries later, another type of urban population started in Gonder. Surrounded on all sides by fertile and well watered land, and at the intersection of three major caravan routes, Gonder seemed to be the perfect place for the capital. The Emperor Fasiladas made Gonder the centre of his country in 1636 and the city became the capital since Lalibela. By the time of the emperor's death in 1667, Gonder's population exceeded up to 65'000 and by then its wealth and splendour had already become a local legend (Gordan and Carillet 2003: 144).

During these three urban episodes, the Ethiopian people of Aksum, Lalibela and Gonder were introduced to the virtues of commerce, the advantages of coins as means of exchange, the usefulness of carts and chariots for transport, the art of building and construction, and in general the advantages of diverse economic activities and the consequent higher standard of living. In spite of that, the Ethiopian population remained essentially rural and failed not only to improve upon the knowledge and skills that already existed, but even to preserve and maintain them (Mesfin Wolde-Mariam 1972: 185).

Bariagaber Hadgu notes: "The main functions of [these cities] and other ancient Ethiopian towns were related to religion and pilgrimage, commerce and handicraft, traditional seats of the kings and cultural-arts activities. Apart from a few magnificent traditional and cultural attainments, these centres could not grow and bring about substantial changes in the socioeconomic development and were not capable to act as centres of influences for the life of the population of the rural hinterlands throughout the years of their existence. As regards population growth, they had considerable population sizes far in the past with fluctuating in size from time to time. The mobile nature of the kings and the feudal nobilities who were in constant move from place to place, devastating the local resources, was one of the main detrimental factors to the growth of the old or new centres" (Bariagaber Hadgu 1996: 71).

Mesfin Wolde-Mariam (1972: 185) states, that there are three more reasons, why the urbanisation of the past could not take roots in Ethiopia:

- The physical configuration discouraged and at times hindered movements of people and goods while at the same time it promoted regional isolation. The fact that the wheel died with Aksum, in spite of being reintroduced by the Portuguese in the 16th Century, is largely due to the corrugated surface of the country on which the donkey and the mule were considered more sure-footed.
- Sociocultural factors discouraged the emergence of people with various skills. It is one of the necessary conditions of urbanisation and therefore of advancement to have groups of people possessing different skills and pride in their skills. The Ethiopian society condemned many occupational groups like blacksmiths, weavers, potters, masons, and even merchants to an inferior status. The Ethiopian society with such an adverse attitude to work and workers could not be expected to be a dynamic one.
- The fluid political conditions manifested by the almost continuous regional wars disallowed appreciable periods of peace for constructive purposes. The human and material resources of the country were almost fully engaged in unproductive and destructive uses. Lack of stability and security precluded any zeal and enthusiasm for advancement.

The fourth urban episode began with the reign of Minilik II and his wife Taytu, who fixed Addis Abeba as the new capital and established other towns as administrative centres besides. Furthermore there were many renewals concerning the infrastructure like the Franco-Ethiopian Railway, which provided an easy and effective means of

contact with the outside world, brought the introduction of radio and telephone communication and in addition the modernisation and centralisation of the administration.

Nevertheless, it was during the Italian Occupation (1935-1941) that the urbanisation developed more rapid. For political and military purposes the Italians built in a very short amount of time a network of effective roads connecting the important administrative centres with the military garrisons. The establishment of factories and the introduction of modern means of transport combined with the insecurity of property and life within the rural areas, attracted a large number of people to move into the towns. The large number of soldiers living in these towns created a new demand on hotels, restaurants, drinking houses and shops. This created a whole new character to the Ethiopian urban complex. During the Italian Occupation various of these towns started to grow at rather explosive rates. As an example the population of Gonder increased in the years from 1938 to 1939 by 15 percent, the one of Jimma by 73.3 percent and the one of Addis Abeba even by 76.7 percent respectively (Mesfin Wolde-Mariam 1972: 187).

4.1.2 The urbanisation process after 1950

Within the 1950s Ethiopia is still largely under urbanised, even considering to African standards. According to the estimates and projections of the Population Division of the United Nations, in 1950 only 4.6 percent of the population lived in urban areas of at least 2'000 people, compared to 14.7 percent for whole Africa. In 1975, the percentage of the urban population increased to a level of 9.5 percent in Ethiopia compared to 25.4 percent in Africa. In the year 2000, the two proportions were 14.9 percent and 36.2 percent respectively. In Ethiopia, one can find hundreds of communities with 2'000 to 5'000 people. In the majority of cases though, these are just extensions of rural villages without any urban administrative function (Golini et al. 2001: 92). Thus, the level of urbanisation would even be lower if one would use strict urban structural criteria.

In the second half of the last century the annual rate of urbanisation moved faster than the African average and those conditions will expand within the next 25 years. Nevertheless, the proportion of urban population in the country will be largely lower than in the continent in the time of 2030. The rural population of Ethiopia will be nearly three times higher than the urban population.

The urbanisation accelerated between 1950 and 1965, when the average growth rate was between 5.47 and 5.87 percent. The urban growth rate between 1980 and 1995 was also quite fast with rates over five percent and a peak in 1985-1990, when the annual rate of change reached 5.2 percent. At the beginning of the 21st century the predicted growth rates of urban population will increase on a lower level until the year 2025 compared to the period 1980-1995.This circumstances make clear that it will remain higher than the African average and it seems the differences are still exceeding (CSA 2005).

The decade 1970-1980 and the beginning of the 1980s offer a very low urban growth rate for Ethiopia, even underlying the average African urban growth rate. Nevertheless, there have been digressive growth rates among the urban areas of the country, which could partly be explained by the following factors:

- During the 1970s, there were some changes in administrative capitals. When former *awraja* (subregion) or regional capital or any other town changed its administrative status, its population size tended to increase or decline. For example, when Arba Minch, Awassa (Southern Ethiopia) and Metu (Western Ethiopia) became regional capitals, the emigration rates from the former regional capitals or rural areas to the new capitals increased enormously and the population growth rates of the new capitals become extremely high during the first few months or years.
- The increase or decline of the population growth rates of certain towns could be explained by the wars in the second half of the 1970s: The Ethiopia-Somali dispute over the Ogaden region, the war between the central Ethiopian government and movements seeking separate independence for Eritrea, the Afar and Oromo movements and the Tigray resistance in Northern Ethiopia. Another reason could be the famine and the drought which forced many people to move away from their traditional place of residence. As part of its response to the famine and drought, the Derg regime initiated a massive national resettlement and villagisation programme intended to bring dispersed rural farmers from drought-prone areas in the north into concentrated farming cooperatives, mostly in western Ethiopia. This controversial resettlement program, supposedly a long-term famine prevention measure, exacerbated the food crisis by not only interfering with agricultural production, but also disrupting social relations. The program engendered discontent among the peasants and out-migration flows towards cities to avoid living in settlements established and controlled by government.
- For most towns, an explanation for the decline in growth rates could be the 1975 Rural Land Act which provided incentives and opportunities for peasants and other potential migrants to stay in rural areas. The post revolution land reforms and the new socioeconomic structures emerging from the societal reorganisation appear to inhibit rural-urban migration.
- Another factor could be the socioeconomic deterioration of the urban environment, particularly the shortage of housing and lack of jobs, which reduced rural-urban and urban-urban movements.
- Differential allocation investments for the development of socio-economic activities among the urban areas could have contributed to some urban areas to maintain still high growth rates (e.g. Akaki, Bahir Dar, Shashemene) as compared with the growth rates of other urban areas like Asela, Aksum or Harer.
- It is also worth to be mentioned the so-called size effect according to which massive migration rates imposed on the originally small based population could have given way to high urban growth rates during the initial periods, but decline during the subsequent years as the base population becomes sizable. (Bariagaber Hadgu 1996: 74,75; Marcus 2002: 181 et sqq.; Mberu 2006: 511-513.)

The annual rate of change of the rural population remained very high, even compared to the average rate of the African continent. Considering the period 1950-2000, Ethiopia reached a rural growth rate of 2.4 percent, whereas Africa reached a rate of 1.99 percent. Until 1975, the growth rate stayed more or less the same as in whole Africa. In the period 1975-1980, Ethiopia had a rapid decline, which can also be recognised in the urban growth rate. In spite the last 15 years of the last century, the rate largely declined in Africa, whereas Ethiopia reached a peak of 3 percent (CSA 2005). Golini (2001: 93) refers to the fact, that the estimated average number of children per woman fell in Africa from 6.52 to 5.06 and for Ethiopia only from 6.81 to 6.30 percent. He observed an excess fertility, which leads to an excess population growth, in spite of a very burdensome high infant mortality rate and low expectation of life.

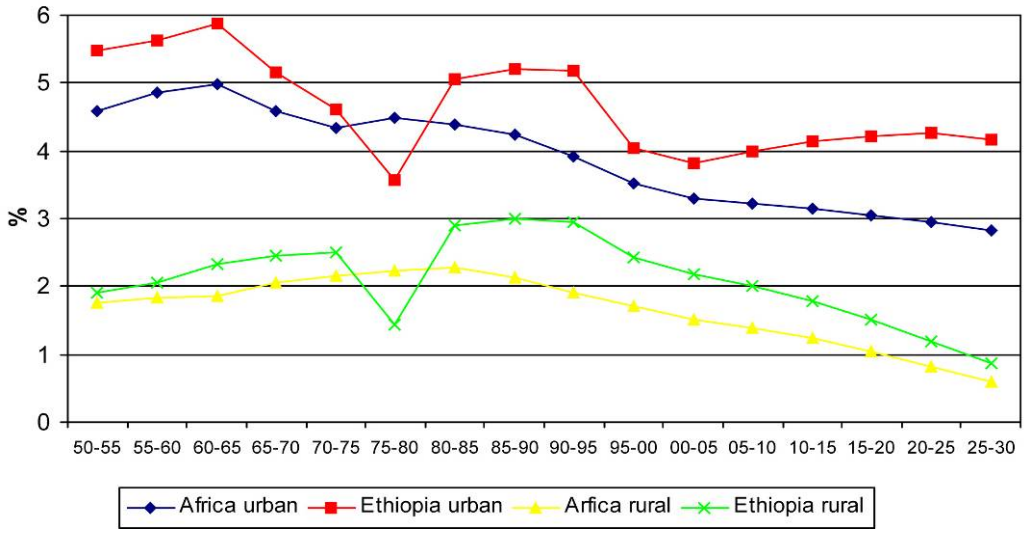

Figure 4-1: Average Annual Rate of Change of the Urban and Rural Population, Africa and Ethiopia, 1950-2030 (CSA 2005).

4.1.3 Growth of cities and towns

In the middle of the last century, the capital was home to more than half of the urban population. As a result of the intense and rapid growth of many cities, the weight of Addis Abeba as the home of the country's urban population largely declined starting within the 1950s. It was the home for almost 24 percent of the urban population in the year 2000 (Golini 2001: 93). "It is during the period before the revolution, in the 1960s, that a system of urban centres developed around the capital city. These urban centres created branches throughout the country to reach the old regional capitals of the north and the political-military checkpoints of the south, connecting with centres of more recent founding at the nodes of the national transport network" (Greppi 1996: 41).

The urban growth was especially evident in the northern half of Ethiopia and along the railway connection between Addis Abeba and Djibuti, where most of the major towns were located. The period 1967-1975 saw the rapid growth of relatively new urban

centres. In only eight years, the increase of Awassa, Arba Minch and Jijiga was more than quadrupled, whereas the increase of Akaki, Shashemene and Bahr Dar was more than tripled. Seven other towns were more than doubled (Ofcansky and LaVerle 1993). Rural to urban migration had been largely responsible for the rapid expansion during this time. Several cities with most rapid growth rates were capitals of newly designated administrative regions and important agricultural centres. Various other towns showed very convenient locations, were newly planned cities or at the site of several industries and education institutes. Some others became communication and service centres. The result is a very high established network of towns and a sufficiently equilibrated territorial distribution of the population (Golini et al. 2001: 93).

The following table shows the population development of the largest cities in Ethiopia.

Table 4-1: Population of largest cities, 1967-2006 (Brinkhoff 2007, Ofcansky and LaVerle 1993 and CSA 2005)

City or town	1967	1975	09.05.1984	11.10.1994	01.07.2006	rate of change 67-06 per cent
Addis Ababa	644190	1136600	1412575	2112737	2973000	461.51
Dire Dawa	50733	76639	98104	164851	281800	555.46
Nazret	27812	59176	76284	127842	228600	821.95
Gonder	36309	64562	80886	112249	194800	536.51
Mekele	23105	47157	61583	96938	169200	732.31
Dessie	40619	56849	68848	97314	169100	416.31
Bahir Dar	12463	43826	54800	96140	167300	1342.37
Jimma	30580	49044	60992	88867	159000	519.95
Debre Zeyit	22055	39675	51143	73372	131200	594.88
Awasa	5575	27517	36169	69169	125300	2247.53
Harer	42771	48559	62160	76378	122000	285.24
Jijiga	4031	18111	23183	56821	98100	2433.64
Shashemene	7837	24459	31531	52080	93200	1189.23
Debre Markos	21536	31842	39808	49297	85600	397.47
Asela	13886	29637	3672	47391	84600	609.25
Nekemte	12691	23342	28824	47258	84500	665.83
Arba Minch	2890	14261	23032	40020	72500	2508.65

It is obvious that the growth of the provincial cities increased faster than the old historical related cities like Addis Abeba, Dire Dawa, Gonder or Harer. Most of the fast-growing cities are nodes of transport network or new administrative and commercial centres.

4.2 Transportation network

Over centuries the country's transport network has rarely been developed. Today, the situation is comparable with the transport situation in the mountain areas worldwide before the industrialisation. For a long time the traditional forms of transport, on the backs of donkeys and mules, were found to be best suited for the Ethiopian terrain and the isolated regions. For a faster way the people used horses, even though this way also needed a certain amount of time and could not be considered fast in normal terms of transport.

4.2.1 Animal transport

Due to the hilly terrain, climate and soils, the Ethiopian transport network is less advanced, particularly in the rural areas. In addition to the formal road network there exists an extensive network of trails and footpaths used by pack animals and pedestrians, primarily for an access to markets and essential services, and means for the majority of the population the far most effective transport system. Pack animal transport mainly by mules and donkeys is the norm and fulfils vital roles for farm and household transport, besides for local trade and the first/last stages of the marketing chain. Sometimes horses and dromedaries are in use depending on the region. In the lowlands of Ethiopia Dromedaries are much more important than other pack animals, especially in the Somali-, Afar- and in other parts of the Harerghe-region There is a limited number of carts, but due to narrow paths, steep, rocky and often slippery surfaces, this traditional form of transport is useless in many parts of rural Ethiopia.

4.2.2 Roads

Until 1935, there had been a number of short and unessential roads of about 2`000 kilometres, which connected Addis Abeba with the old provinces of Kaffa in the southeast and Godjam in the western part of Ethiopia. The Italians were the ones, pressed by the need for facilities of transport, who built a network of roads through the most difficult terrain with amazing rapidity. They completed "within twentyfour months of their conquest no less than 2`000 miles of fully metalled and tar-treated roads" (Larebo Haile Mariam 1994: 60). During the war, the Italian-built roads and in particular the bridges suffered by destruction. After the war the road construction was completely neglected and a lot of the roads were unusable or at least strongly damaged.

In 1951 the Imperial Highway Authority (IHA) was established as a result of an agreement between the Imperial Ethiopian Government, the International Bank for Reconstruction and Development and the United States Bureau of Public Roads. Between their initiation and 1970, the IHA expanded the network of motorable highways to nearly 7`000 kilometres of all-weather roads. In other figures, this means one kilometre of road for more than 171 km^2 (Mesfin Wolde-Mariam 1972: 154).

After the revolution, the Derg restructured the IHA as the Ethiopian Road Authority and the Rural Roads Task Force. The government created the latter to develop rural roads outside the main system and to extend feeder roads within the main system. There had been many donors, who helped to push this project, but Ethiopia's road network remained primitive and extremely limited. This shortcoming had tragic consequences during the 1984-85 famine, when the lack of good roads contributed to Ethiopia's inability to distribute food to famine victims (Marcus 2002: 210).

In 1997 the Ethiopian government formulated a ten year Road Sector Development Programme (RSDP). The first phase focused on the rehabilitation of essential highways and on major policy and institutional reforms, the second phase aims to an expansion of the road network, with a particular view on connecting rural areas. Road density has increased from 24.1 km/1000m^2 in 1997 to 33.2 km/1000m^2 in 2004 (OECD 2006).

Ethiopia had 36`728 kilometres of all-weather roads in 2004, whereas 4`683 kilometres were paved (CSA 2005).

4.2.3 Railway

The railway system consists of a 781 kilometre single track corridor from Addis Abeba to Djibouti, of which 681 kilometres belong to Ethiopia. A French company built the railway by authority of Emperor Minilik II. The construction began in 1897 at the port city of Djibouti, and the final link reached Addis Abeba in 1917. Like the railways in most parts of Africa, the short Ethiopian railway system was designed primarily for transporting raw materials to foreign market. For a long time they were the only means of contact with the outside world.

In 1955 the railway carried out 255`200 tons of freight and 357`000 passengers (Medhane Abraham 1970: 50). The peak of freight volume was reached by the year 1975 with 453`000 tons, and the peak of passenger transport with over 1.3 million in the 1980s (Statistisches Bundesamt 1990: 65). Since the Eritrean-Ethiopian border dispute of the late 90s, the railway has carried a significant role by the country's imports and exports to and from the Red Sea port of Djibouti city, even though the freight never reached the volume of the 1970s. Today the Chemin de Fer Djibouti-Ethiopien is jointly owned by the governments of the two countries under a 1981 treaty. In 2004 they transported more than 125`000 passengers, 108`488 tons of import freight, 75`780 of export freight and 20`148 tons of internal freight (CSA 2005).

4.2.4 Air transport

Distance, terrain and an underdeveloped road system made air transport to an important part of Ethiopia's transportation network. The government-owned Ethiopian Airlines began operations in 1946. The opening of many parts of the country was made possible only through the development of that air transport.

Today, Ethiopian Airlines operate a modern fleet of aircrafts headed by six Boeing 767-300s, four Boeing 757s, four Boeing 737-700s and a Boeing 737-260. For the domestic routes, they use five Fokker 50s and three DHC Twin Otters. They serve 25 domestic destinations, 25 destinations in other African countries and 17 destinations in Asia, Europe and North America. Additionally they have 40 cargo destinations spread across Africa, Europe, Asia and the Middle East (Ethiopian Airlines 2006).

4.2.5 Shipping traffic

Ethiopia as a landlocked country has no direct access to the sea. In spite of that, Ethiopia has a state-owned maritime transport company with 12 ships, which provide shipping services to various European ports as well as to ports in Northern Africa, East Africa, the Middle East and the Far East.

Ethiopia itself has no significant navigable waterways, although limited ferry service is available on Lake Tana. Traders also transport local goods on Lake Abaya and Lake

Chamo in the south of the country. The Baro and Awash rivers are navigable only in the rainy season. The Abay (Blue Nile) is not navigable within Ethiopia's borders.

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5 Ethiopia in the international context

Compiled by Antonia Eisenhut

Abstract

Ethiopia has a very rich and powerful past. In the last 40 years, things have changed; Ethiopia became famous because of wars, famines and droughts. But also positive headlines like sports success are often ignored. In this short work the author would like to explain how Ethiopia moved and moves on the international parquet and how it tries to solve its problems by interacting with other countries, especially with Switzerland.

5.1 Historical dimension – Foreign influences on Ethiopia during the last two centuries

Ethiopia doesn't correspond to the euro-centrist view of an uncivilised African jungle being explored and brought to daylight by some European discoverers. On the contrary, many researchers regard Ethiopia as the place, where we have to look for humanity's origins[1]! Since very early times, Ethiopia has entered in contact with other peoples and countries, for example with the ancient Egyptians (Henze 2000: 15). This work will focus on the contacts during the last two centuries.

Except the short invasion by Italy, Ethiopia is, besides Liberia, the only country of Africa, which has never been colonialised by Europeans. But due to his strategically position, several European powers tried to establish themselves in Ethiopia (Henze 2000: 154 ff).

Great Britain

The British expedition to Abyssinia2 took place in 1868. As Emperor Tewodros II didn't receive any answer to a letter he wrote to the British queen, he made a number of British officials and missionaries his prisoners, provoking their violent liberation by the British army (Henze 2000: 137 ff).

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1 Lucy, the legendary female Australopithecus afarensis, older than 3 Mio years, has been found 1974 close to the Awash River in Ethiopia (Henze 2000: 1).

2 Former name of Ethiopia.

Italy

In 1882, the Italian government bought the port of Assab (see Figure 5-1). A few years later, the Egyptians and the British gave them as well the port of Massawa. After the death of Emperor Yohannis IV of Ethiopia in 1889 (who during his life time had managed to find a certain peace agreement with the Italian powers), the Italians cheated on the new Emperor Minilik II, by making him sign a treaty which didn't mean the same in Italian than in Amharic. They named their new colony Eritrea (Henze 2000: 161).

Figure 5-1: Map of Eritrea (CIA 2006)

In 1895, Minilik II had strengthened his power and refused the treaty whit the Italians. As a response, Italy attacked Ethiopia from the Eritrean border, but they were defeated by the Ethiopian army in the battle of Adua. This victory has turned into a legend, because it was one of the very few occasions an African army achieved to defeat a European one. In consequence, Italy had to recognise the Ethiopian independency in the Treaty of Addis Abeba[1] in 1896 (Henze 2000: 172).

In 1935, Mussolini tried to reach his goal to rule over a Mediterranean empire. Ethiopia was his favourite target, mainly because it was not yet colonialised and because it bordered on Eritrea (belonging to Italy at this period) and on Italian Somaliland. On

1 Ethiopia remained independent, but Eritrea was an Italian colony until World War II, when Eritrea became a British protectorate (Henze 2000: 240).

October 3 in 1935, 100'000 Italian soldiers and *Askari*[1] attacked from Eritrea and from Somaliland without declaration of War. After several Ethiopian defeats and some very bloody massacres, Emperor Hayle Selasse fled into exile on in spring 1936, and Italy annexed the country on May 7. Victor Emmanuel III of Italy was proclaimed Emperor. Ethiopia, Eritrea and Somaliland formed now one colonialised state called Italian East Africa. Nevertheless, this was a very short-living situation; at World War II, Ethiopia was liberated during the East African Campaign by the Allies in 1940. After the war, Eritrea was coming a little bit closer to Ethiopia again; even though it had its own parliament, Eritrea stood under the influence of Hayle Selasse, who was represented by a viceroy in Eritrea (Henze 2000: 243).

Soviet Union

After World War II, Ethiopia experienced a quiet period under his Emperor Hayle Selasse, who was very active on the diplomatic front. Ethiopia was a founding member of the United Nations (UN) and the Organization of African Unity (OAU) (see sub-chapter 5.3). After the post-war relationship with Great Britain deteriorated, the emperor in 1953 asked the United States for military assistance and economic support (Henze 2000: 247). Although his dependence on Washington grew, Hayle Selasse asked other nations for support, for example Italy (which is quite remarkable so soon after the war), China, the Federal Republic of Germany, Taiwan, Yugoslavia, Sweden, and the Soviet Union (Federal Research Division of the Library of Congress 1989).

In 1974, Hayle Selasse deposed for different reasons and the Derg, a provisional administrative council of soldiers, got to the power and installed a socialistic government with military structure. They ruled Ethiopia until 1987. After a quite agitated period, Mengistu Hayle Mariam managed to put himself on the head position of the Derg. He gave order to kill thousands of people and reformed the whole social system with the financial help of the Soviet Union. In return, Ethiopia signed a military assistance agreement with the Soviets and abandoned the one with the Americans. The Ethiopian communism is known on a international level over all because of the "Ethiopian red terror", killing thousands of people in 1977 and 78, and because of the destruction of the quite successful educational system being installed before by Hayle Selasse (Henze 2000: 265 ff).

5.2 Ethiopia as a member of the UNO

Emperor Hayle Selasse was very active in diplomacy. He was eager to establish Ethiopia as a well-organised and strong independent African nation in the international context. Due to his initiative, Ethiopia was one of the founding members of the UNO in 1945 by signing the United Nations Declaration (Federal Research Division of the

1 "Askari" is an Arabic, Persian and Swahili word meaning "soldier" (Arabic: عسكري 'askarī). It was frequently used to describe indigenous troops in East Africa and the Middle East serving European colonial powers but also describes policemen and security guards" (Wikimedia 2006a).

Library of Congress 1989). Since the UN has a lot of organs and adherent NGOs, Ethiopia also takes part in them. Some of them are presented in the following sub-chapters.

5.2.1 ECA (Economic Commission for Africa)

The ECA was founded in 1958 with the aim of supporting the development in both the social and the economic field of the African member countries. Ethiopia takes a special rule inside the ECA, since it hosts its headquarter in Addis Abeba. ECA is under the control of the UN Economic and Social Council (ECOSOC) (ECA 2006).

ECA gave birth to a number of Regional Economic Communities, one of them being the Common Market for Eastern and Southern Africa (COMESA). The COMESA covers a region[1] where, before its foundation in 1994 had already existed a preferential trade area (ECA 2006). On their Web page, COMESA defines its aims as follows:

"(…) Most COMESA countries are individually too small to achieve economies of scale in the production and marketing of their products and need to work together as a region if they are to achieve significant levels of economic growth and compete in a world market which is becoming increasingly dominated by large trading blocs. If the COMESA region is to benefit from sustainable economic growth it will need to do this through trade liberalisation and regional integration. (…)" (COMESA 2006).

Especially in the mineral sector, cooperation can be very useful, since the COMESA region has a lot of valuables deposits[2]. COMESA tries to organise the infrastructure, to establish a free trade area and to reach the same currency and the free movement of persons within its boundaries.

5.2.2 AU (African Union)

With the exception of Morocco, all African nations are member of the AU. The AU has been founded in 2002, by replacing both the African Economic Community (AEC) and the Organisation of African Unity (OAU). The aims of the AU are very wide spread and reach from education and health care to peacekeeping, human rights, global economic integration and sustainable development[3] (AU 2003). Two of the instruments to reach these goals are the Pan-African Parliament and the African Court of Justice. As in the case of the ECA, AU's headquarter is located in Addis Abeba. In general, Ethiopia has very good relationships to most of the African countries (MFA 2006a).

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1 for the detailed member list, consult http://www.comesa.int/comesa/countries.

2 For example oil, copper, phosphates, iron, uranium, nickel, cobalt (COMESA 2006).

3 For more detailed information, see http://www.africa-union.org/root/au/AboutAu/constitutive_Act_en.htm#Article1.

5.2.3 IMF (International Monetary Fund)

The IMF was founded in 1945 aiming to avoid another disaster like the Great Depression in the 1930s. It tries to support the stability of the international monetary and financial system, to prevent financial crises and, in a general way, to promote the economic development all over the globe (IMF 2006a).

Ethiopia is classified as a "heavily indebted poor country". Its total debt by January 2006 was about 112.07 SRD Millions[1] (IMF 2006b). Ethiopia's population is very poor; in 2002, the Ethiopian government created a Poverty Reducing Strategy Paper (PRSP) within the framework of the IMF and the World Bank to reduce this poverty and to go for a sustainable development. In this program, the Ministry of Finance and Economic Development proposes the following means to reach these aims: The support of the agricultural sector (including research), the strengthening of the private sector, a growing export, investments in education, decentralisation, improvements in the government, food security, irrigation, development programs and so on (IMF 2002). In the same paper, the Ministry expresses its will to depend less on international aid (IMF 2002). This program shall be financed by a mixture of domestic revenues, grants, external loans and others. Andrews et al. consider the aimed economic growth possible if the necessary international aid will be big enough (Andrews et al. 2005).

5.2.4 IGAD (Intergovernmental Authority on Development

Between 1974 and 1984, several droughts and famines afflicted the eastern part of Africa. These disasters led to the creation of the IGAD, a network in the region to support each other. Its members are Djibouti, Eritrea, Ethiopia, Kenya, Somalia and Uganda. Its missions are food security, environmental protection, economic cooperation and integration and peacekeeping (IGAD 2006). One of the striking features of the IGAD is the creation of the Conflict Early Warning and Response Mechanism (CEWARN), which has been established to solve the potential conflicts in the region before they would escalate. The CEWARN headquarter is located in Addis Abeba (CEWARN 2005).

5.3 Ethiopia as a developing country

Generally said, Ethiopia is a very poor and indebted country. In the UN-classification (UN OHRLLS 2005) Ethiopia is both among the least developed and among the landlocked developing countries, which means that it is remote to big markets, that there is no sea and that transport costs are much too high for a healthy economy to grow. Since the terrible famines in the 1980s, Ethiopia is even internationally famous by being so poor. Between 1984 and 2000 Ethiopia received about ten million tons of

1 Special Drawing Rights: " (…) SDRs are defined in terms of a basket of major currencies used in international trade and finance. At present, the currencies in the basket are the euro, the pound sterling, the Japanese yen and the United States dollar. The amounts of each currency making up one SDR are chosen in accordance with the relative importance of the currency in international trade and finance (…) (Wikimedia 2006b).

food aid (Deres Abdulkadir 2006: 14). Nowadays, about five million people depend on this aid, which doesn't really have any impact on sustainable development (Deres Abdulkadir 2006: 14). In the following subchapters, the most interesting points of this roughly resumed current condition of the Ethiopian nation will be dwelled on.

As described in subchapter 5.2, Ethiopia takes part in a lot of international organisations, not only for the goal of receiving financial aid. But of course this is an important part of an international network, and there are as well a lot of initiatives which have been created with the explicit goal to give financial or other help to the Ethiopian government and to its people. In the following subchapters, we will present some examples, first on a regional scale, with Ethiopia as member state, later specified on the Ethiopian case.

5.3.1 EU/ACP – a controversial trading agreement

The EU defines its development policy for Africa as follows:

"The objective is to step-up EU interaction with and support to Pan-African initiatives and institutions, notably the African Union and its socio-economic programme NEPAD[1]. A structured dialogue, substantial institutional support and an effective coordination of EU and AU policies in support of continental cooperation and integration in Africa are our main objectives in the coming years" (Directorate General for Development of the EU 2006).

Instruments to reach these goals are trading agreements, which have been worked out for Ethiopia and other African countries in line with other ACP states (ECDPM 2006). ACP stands for Africa, Caribbean and Pacific. States from this region have signed the Lomé Convention in Lomé (Togo) in 1975 together with the European Community (ECPDM 2001a). The convention is a trading and aid agreement between the EC and the ACP-states. The main aims of the relation between the EC (and later the EU) and the ACP-countries are defined as follows:

"The central objective of the Partnership Agreement is to reduce and eventually eradicate poverty while contributing to sustainable development and to the gradual integration of ACP countries into the world economy" (ECDPM 2001b).

The main issues to reach this goal were on the one hand side the duty free import of mineral and agricultural goods from the ACP states into Europe, and, on the other hand, the EC gave 3 billions ECU[2] aid and investment to these countries (ECDPM 2001a). The Lomé Convention has been renewed in 1981, in 1985 and in 1989. During this period, the number of members from the ACP side has grown from 46 to 71. From 1990 until 1995, the Secretary-General was an Ethiopian (ACP Secretariat 2005).

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1 NEPAD = New Partnership for Africa's Development (NEPAD 2005).

2 ECU = „The European Currency Unit (ECU) was a basket of the currencies of the European Community member states, used as the unit of account of the European Community before being replaced by the euro." (Wikimedia 2006b).

In 2000, the Lomé Convention has been replaced by the Cotonou Agreement, signed in Benin and revised in 2005. It should last until 2020. There are four main changes compared to the Lomé Convention (ECDPM 2001c):

1. Politics will play a bigger role. Issues not concerning classical development aid will be discussed.
2. Non-state actors and local authorities will take part.
3. The non-reciprocal trade preference given to the ACP-states by the EU is replaced by individual agreements between EU and ACP-countries (Economic Partnership Agreements (EPAs)).
4. The EU is more flexible by distributing the financial aid. "Good performers" will get more, "bad performers" less money.

The Cotonou Agreement is very controversial. The disputed point is that the EU has insisted in a quite strict application of the WTO rules aiming only for a free trade agreement. ACP-states have been negotiating with the WTO but they rejected the agreements, because they were afraid of the negative consequences of some WTO aims (for example investment, competition, trade facilitation, government procurement) on their development. Critics now argue that the EU tries to apply these principles indirectly by the EPAs with the goal to eliminate all trade barriers of about 9 percent of trade with the ACP-countries (KOSA 2006).

In financial terms, the aid from the EU adds up to 1,913.18 million Euros under the four Lomé Conventions and 537.9 million Euros shall be paid until 2007 under the Cotonou Agreement. The money is planned to be distributed as follows: Transport Infrastructure: five percent; Macro Economic Support: 25 percent; Food Security: 14 percent; other programmes: six percent (MFA 2006b).

5.3.2 UNMEE (The United Nations Mission in Ethiopia and Eritrea)

In 1998, a war between Ethiopia and Eritrea broke out because of a border dispute. A big humanitarian drama followed, as a severe drought took place at the same time in parts of Ethiopia, leading to about eight million people affected. In consequence, this UN Mission has been created in the year 2000. Since then, it remained on the spot to mark the border between the two countries. Its offices are located in Addis Abeba and in Asmara, Eritrea. The mission's protected area is a band of 25 km width on the Eritrean side of the border. The UN Secretary-General recommended a total of 4'200 military personnel, three infantry battalions and the necessary support staff. The mandate has been readjusted several times, at last in May 2006, with its key contents staying the same, and prolonging the mandate until 30 September 2006. At the end of April 2006, the UNMEE was composed of 3,373 military personnel, including 3,152 troops and 221 military observers supported by 162 international civilians, 207 local civilians and 65 UN Volunteers (UNMEE 2006). Several countries participate in the UNMEE, including Switzerland who sent four officials as military observers. There are also election observers, for example in the elections of 2005, where they reported inconsistencies in the election result, but they could not avoid the disturbances in the population afterwards (SWISSINT 2006).

5.3.3 Ethiopia as a sports nation

A field Ethiopia is a worldwide leading nation are sports, especially in athletics, mainly long-distance running. Sports on an international level provide an excellent opportunity for breaking out of poverty. The most famous male runner is Haile GebrSelasse, born in 1973. Up to now, he Set 15 world records (e.g. five and ten km outdoor and five km indoor) and world bests. In other disciplines, as for example 3000m, he is unbeaten for years yet (IAAF 2007a). Among female runners, Meseret Defar is one of the most successful one at the moment; in 2006 she won gold over 3000m both at the 4th IAAF World Athletics Final and at the 11th IAAF World Indoor Championships and over 5000m at the 4th IAAF World Athletics Final as well and at the 10th IAAF World Cup (IAAD 2007b).

5.4 Ethiopia and Switzerland

The good relations between Switzerland and Ethiopia started in 1878, when the Swiss engineer Alfred Ilg constructed the first railway from Addis Abeba to Djibouti (Perrenoud 2001). In the 1930s, Ethiopia exported a lot of coffee to Switzerland (Perrenoud 2001). The occupation of Ethiopia by Italy in 1935 ended up with this business due to the UN sanctions against Italy (Perrenoud 2001).

Already in 1924, Ethiopia opened its first honorary consulate in Zurich. Switzerland followed in 1952 by establishing its embassy in Addis Abeba (MFA 2006c).

After the change of power in Ethiopia in 1974, the relations deteriorated, and Ethiopian refugees came to Switzerland. The new socialist government accused former Emperor Hayle Selasse of having deposed his fortune on Swiss banc accounts, but this theory never found solid proofs (Perrenoud 2001).

5.4.1 Bilateral agreements

Switzerland mainly imports coffee and leather and exports machines, watches and chemical products to Ethiopia. Ethiopia and Switzerland have signed the following treaties (MFA 2006c):

- 1933: Friendship and Trade Agreement:
  A rather general agreement, aiming to consolidate the good relations between both countries (EDA 2006a).
- 1998: Agreement on the Promotion and Reciprocal Protection of Investments: Both countries wish to intensify their economic cooperation. To reach this, they want to establish good conditions of investment in both countries for investors from the other country. The treaty guarantees protection and safety of the investors and the free transfer of amounts connected to the investment. It also determines what to do in case of disagreements (EDA 2006b).
- 2000: Air Service Agreement:
  Determines the rules in the field of air traffic, for example laws and rights in

force in different cases, security, operating approvals, charges, flight plans and others (EDA 2006c).

5.4.2 Development cooperation

Switzerland has been providing technical and humanitarian assistance to Ethiopia in forest development and in efforts to prevent humanitarian disaster, even though Ethiopia is not a focal country in Swiss development aid (DEZA 2001). In its development strategy for Africa from 2000 until 2010, Switzerland emphasises the wish to intensify the help for the Horn of Africa. In 2005, Switzerland paid 51.2 million Swiss Francs to the African development fund (DEZA and Seco 2006: 15). Another 392.4 millions have been paid to several African countries on the bilateral way (DEZA 2006: 16). Since Ethiopia is not one of the hot spots of Swiss development aid, it is not mentioned separately in the statistics. Switzerland also gave 219.5 millions to Swiss NGOs, among them 33.4 millions to Helvetas (DEZA and Seco 2006: 22), who is also active in Ethiopia (see sub-chapter 5.3.). Other NGOs are active in Ethiopia as well: Caritas runs a project in the semi-arid north of the country in the ambit of water management (Zeitgeistgroup AG 2006), the HEKS supports among other things the Nuer, a nomadic tribe dedicated to cattle-breeding (HEKS 2006). Another important contribution of Swiss development cooperation are several scientific research programs and projects, a lot of them realised by the University of Bern.

5.4.3 Helvetas – an example for developing assistance

Helvetas is a Swiss NGO founded in 1955. Its not bound to any religious or political direction. Helvetas' main task is to improve people's living conditions in rural regions in about 20 partner countries in Africa, Asia and Latin America, among them Ethiopia (Helvetas 2006a).

Helvetas started its work in Ethiopia in 1976 but decided to leave the country in 1983 due to the politic situation. In 2003 they came back. Helvetas' program in Ethiopia has two pillars: first to ensure the availability of food for everybody in the different parts of the country, and second, to promote science and knowledge and to exchange them. This knowledge relates to agriculture, since three fourths of Ethiopia's population work in this field. In the northern part of the country, Helvetas puts his focus on the amelioration of the cultivation of cactuses[1], and in the South they try to promote sustainable land use in general. They also try to support the local authorities by helping to construct infrastructure (for example hanging bridges), they establish a controlling system for the tse-tse-fly and they try to bring farmers together in a network. By interaction of the population, democratic ways of decision finding shall replace slowly the old hierarchic system (Helvetas 2006b).

1 Cactuses are used for example for the fabrication of soap.

5.5 Conclusion

As written in the beginning, Ethiopia has always been active on the international level, from very early times on. Its only in the last 40 years when its situation has deteriorated and it is perceived by the outside world as a very poor and undeveloped country. The reasons for that may lie in the political development, but as well in the climatic change affecting all the sub-Saharan countries. Let's hope that Ethiopia can find sustainable solutions to overcome its problems with the help of its good international connections and reach its independency in the economic field as well.

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Part II – Biophysical overview

6 Geology and soils of Ethiopia

Compiled by Stefan Zingg and Tadele Amare

Abstract

The Ethiopian landscape presents itself in a great variability, due to tectonic processes that lifted the region out of the surrounding lowlands. The opening of the Ethiopian Rift Valley and the starting erosion processes shaped the Ethiopian Highlands and are responsible for today's appearance of the "Roof of Africa". Mountain regions are characterised by varied environmental conditions. Therefore a great number of different soil types could develop in Ethiopia. Arid soils of the deserts are present as well as humid and fertile sites.

6.1 Geology

6.1.1 Geological development

The development of Ethiopian geology can be subdivided into three major structural units:

Precambrian basement

The formation of the crystalline basement has its origin in tectonic processes in the Precambrian (Mohr 1971: 4). The flat surface of the highly metamorphic terrane, building the Horn of Africa, reflects a long time period of tectonical calmness where erosion could take place. The older (Archaic) basement consists of metamorphic gneisses and granitoids. Described are moreover granulites and migmatits. Occurrences of meta-sandstone, quarzit, schist, gneiss and marble have Proterozoic origin. The Younger Precambrian (Late Proterozoic) led to the formation of the Greenstone Belts with meta-vulcanites and meta-sediments of green slate facies. Other Proterozoic belts consist of amphibolit and other basic and ultra-basic rock. As youngest Precambric rocks lay phyllites, graphit slates, lime stones and dolomites partly unconformly on the older rocks (FAO 1977: 50; Wegner and Hausser 1996: 10) (see Figure 6-1, E-G).

Palaeozoic and Mesocoic sediments

The Paleozoic and Mesozoic top layers do not continuously exist. Permian-carboniferous sands, which were deposited continental or in shallow sea, were overlapped by fluvo-glacial sediments. The phanerozoic layers can be very thick: Series of sand, clay and silt stones and anhydrites can reach a thickness up to 1600m in

central Ethiopia and even up to 6000m in Ogaden. The youngest layer consists of Jurassic and Cretaceous clay stone, gypsum and marl (Wegner and Hausser 1996: 11F) (see Figure 6-1, D.).

Cenozoic volcanites and sediments

Above the Palaeozoic and Mesozoic sediment series lays a complex of plateau basalts. Up to 3000m thick layers of volcanic rock were built due to tectonic activity since the Late Mesozoic. The greater part of the Ethiopian Highlands was formed by lava that was extracted through fissures and volcanoes. Enormous quantities of lava effused onto the Mesozoic surface or the basement complex, building the Ashangi group.

Joining the Ethiopian swell, the crystalline basement rocks, the overlying Phanerozoic sediments and the Early Tertiary basalts were uplifted toward the end of the Eocene, prior to the main Alpine orogeny. This uplift was accompanied by an effusion of magma and the outpouring of the basalts of the Magdala group.

The rifting and consequently the building of the Rift Valley, which extends from Syria through Ethiopia to south-eastern Africa, started during the Alpine orogeny. The rift faulting was accompanied on large scale by a major upheaval and the outpouring of the basalts of the Shield group during the Eocene-Oligocene, producing lava sheets and many volcanoes.

The major faulting (Upper Pliocene) determined the subsidence of the Rift Valleys. Into the Pleistocene this was followed by a phase of increasing fissure eruptions that built the Aden volcanic series. (FAO 1977: 50; Mohr 1971: 13).

Except from volcanic piles the Tertiary volcanic basalt extrusions could not change the monotonously flat surface. Tectonic and erosive activities due to the uplift and rifting could finally break this pattern (Mohr 1971:10). The arised topographical differences increased geomorphological processes and the shift of eroded material. From Tertiary to today, depressions like the Rift Valley or the Afar region were filled by mighty sediment sequences of volcanic rocks, tuffs and lacustrine sediments. A part from clastic sediments are there also thick layers of Quarternary evaporites with gypsum, anahydrite, halite and other salts (FAO 1977: 50; Wegner and Häusser 1996: 12). Moreover caused volcanic eruptions the formation of several ash layers (see Figure 6-1, A-C).

6.1.2 Ethiopian landscape

Today's landscape is dominated by tectonic features on large scale. But on smaller scale other factors like denudation and sedimentation, volcanic structures or erodibility of underlying rock type are important and determine the relief (Mohr 1971: l2f).

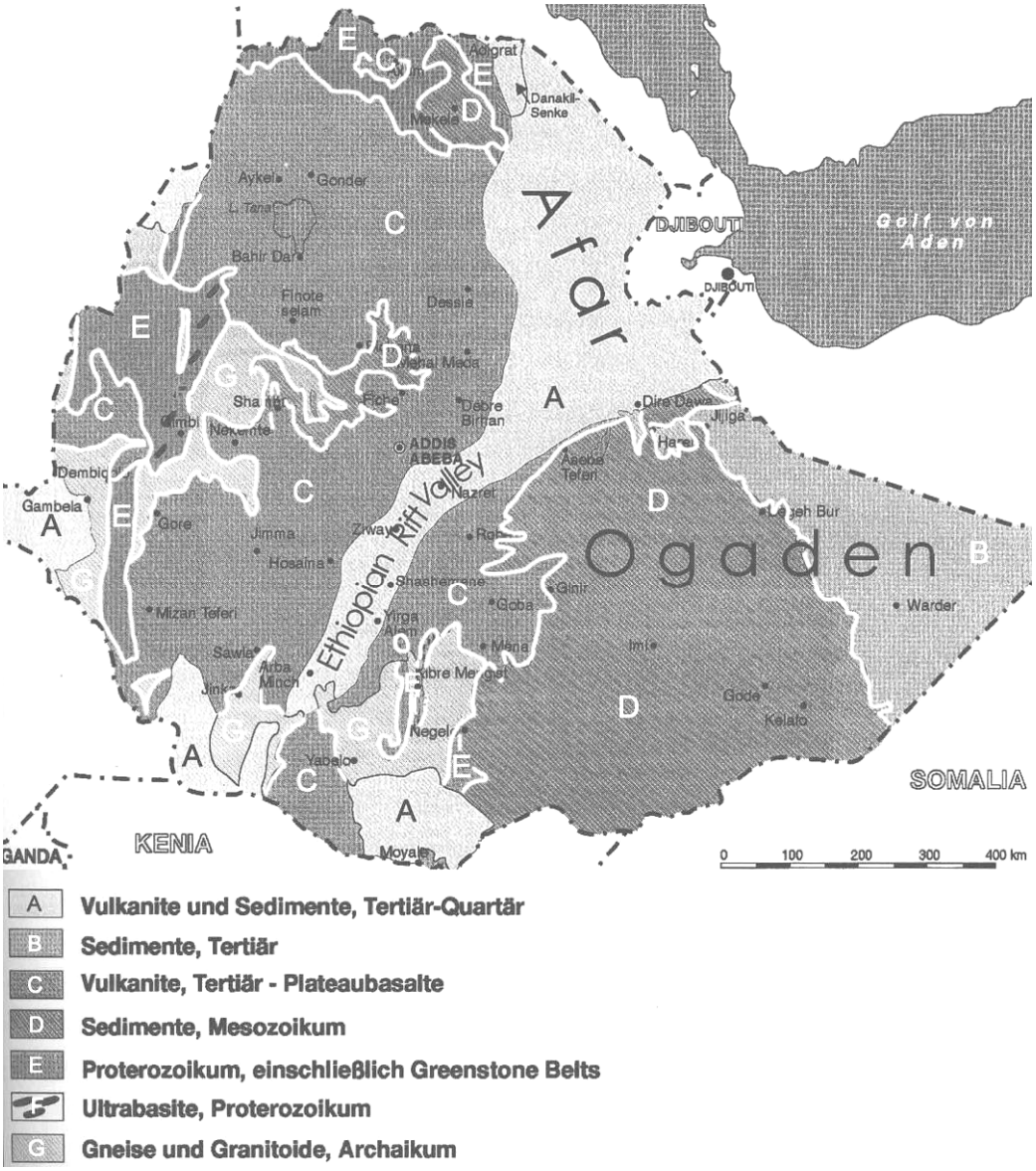

Figure 6-1: Ethiopia – Geological overview (Wegner and Häusser 1996: 11)

Today the **Ethiopian Highlands** are a rugged upland with an average altitude of about 2500m. Except from the major river valleys the whole of this region lies above 1000m. It is split into two unequal parts by the Ethiopian Rift Valley.

The Ethiopian Highlands consist of flat high plateaus but also of hills and mountains, separated and cut by deep canyons. The great height of the Ethiopian highland above sea level caused the rivers to cut valleys of great depth. Volcanic mountains rise often as flat and rather unimpressive masses above the general plateau level. At some places there exist spectacular escarpments. On the west the mountainous area merges by terraces and broken foothills into the Sudanese plains.

Todays surface is widespreadly reflecting the stepped characteristics of the trap basalt series. The Ashangi, Magdala and Shield groups are horizontal and form a monotonous

flat surface. Because of regressive erosion of the lavas along the upper part of the Blue Nile Mesozoic limestone outcrops cover an extensive area.

In contrast to the North where elevations range from 2400 to 4550m, the peaks in the southern part don't reach more than 3700m. The eastern mountain peaks reach an altitude of 3000m to 4300m. Many of the highest peaks exist along the Rift Valley. But there are also several great heights in more central parts, for example in the Simen massif, a volcanic pile of Hawaiian-type, which includes with Ras Dejen (4533m) the highest peak in Ethiopia.

The **Rift Valley** is a dominant element of Ethiopia's landscape. Recent earthquakes and volcanic eruptions prove that the rift zone is still active. The 500 km long and 50-80 km wide feature divides the highland and forms the Awash Valley and its southern extensions towards Lake Rudolf in Kenya. Along the whole length of the rift system there exist gigantic horst and graben systems, whose features were enlarged by erosional processes. The Rift valley is filled by sediments and volcanic rocks.

In the North the Rift Valley merges into a sagged clod, the **Afar Depression**. This depression lays partly more than 100 meters below sea level. This contrasts clearly to the elevation of the bordering mountains. Mighty clastic sediments and salt layers were deposited there (FAO 1977: 50; Wegner and Hausser 1996: 12).

On the East the highland drops steeply to the lowland. The **Somali Plateau** which contains Ogaden, the south-eastern part of Ethiopia, is an arid, broken and eroded desert area that took shape parallel to the formation of the Ethiopian highlands (FAO 1977: 37f; Mohr 1971: 10ff). The older outcropping rocks are metamorphic and intrusive rocks of the basement complex. They are partly overlaid by the Aden volcanic series. Beside them exist shallow marine and continental deposits produced in the Mesocoic (FAO 1977: 50).

6.2 Soils

Soils are the uppermost part of the continental crust, consisting of mineral and organic matter, including living organisms. They are the linking element between atmosphere and underlying geology. The characteristics of soils depends on several factors: Scheffer and Schachtschabel (2002) mention parent rock, climate, living organisms, relief and time as characterising factors for the soil genesis. In their complex interaction these factors trigger the abundance of soil-building processes.

The climatic, geological and topographical variability of Ethiopia encourage the formation of different soil types. For example conditions for soil development in the Afar region differs in extrema from those in the Simen Mountains: It seems to be obvious that a soil, that developed out of sediments in a flat, desert area can't be the same, that developed in a volcanic mountain region with steep slopes covered by vegetation.

6.2.1 Regional distribution

The description of the regional distribution of soil types in Ethiopia refers to FAO's soil map of the world (1977). See also the chapters on 'Geology' and 'Climate' for additional information. The characterisation of the different soil units can be found in subchapter 6.2.2.

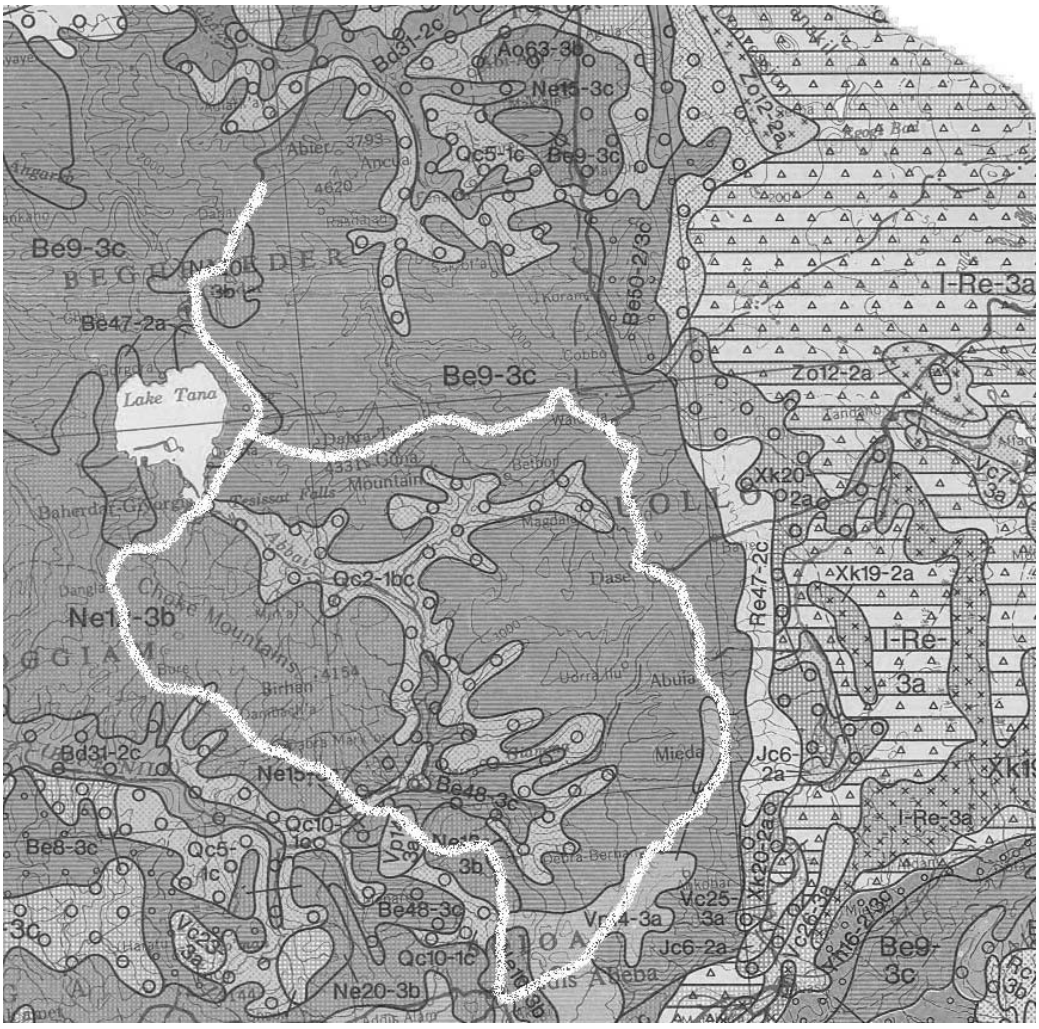

Figure 6-2: Major soil types in Northern Ethiopia (FAO 1977) with the route of the study tour.

Legend:

A	Acrisols	N	Nitosols	X	Xerosols
B	Cambisols	Q	Arenosols	Y	Yermosols
F	Ferralsols	R	Regosols	Z	Solonchaks
I	Lithosols	T	Andosols		
J	Fluvisols	V	Vertisols		

Ethiopian Highland

Due to the heterogeneity of the soil-building factors in the Ethiopian Highlands different types of soils in different stages of development exist.

In the highlands west of the Rift-Valley and Afar, where mainly basalts are lying on top, Nitosols and Cambisols are the dominating soil types.

Vertisols and Regosols exist mainly along the edge to the arid lowlands east and west. A stripe of Arenosols exists along the canyons of the blue Nile and its tributary rivers. Moreover an area along the Rift-Valley exists where enough time for development was given to build Ferralsols. Occurence of volcanic ashes let Andosols arise.

The soils in the highlands between the Rift-Valley and the south-eastern lowlands show a strip of Nitosols in the South and Cambisols in the North with local appearance of Ferralsols and Acrisols. To the East fertility decreases rapidly and Yermosols, Regosols and Xerosols characterise the landscape.

Lowlands

The aridity in the Rift Valley impede the growth of vegetation. The low availability of organic material leads to the formation of humus-poor soils. Evaporation and missing drainage support salination. Xerosols in the northern and Yermosols in the southern part dominate in the Rift-Valley. The occurence of Fluvisols, that allow agriculturale use, set a fertile contrast along rivers.

The dry conditions of the Afar region restricted an intense soil development. Low developed soil like Lithosols and Regosols dominates there. Xerosols occure at the southern and western edge of the depression. There is also a restricted occurrence of Solonchaks, Vertisols and Fluvisols.

In the arid lowlands of south-eastern Ethiopia Yermosols and Regosols are the dominant soil types. Along river valleys exist stripes with Fluvisols.

Luvisols are an unit of FAO's soil map of the world, summarising all soils with clay-shifting and high basal saturation (Leser 1997).

6.2.2 Soil units

The characterisation of the soil units refers to Scheffer and Schachtschabel (2002). The description of regional distribution of the soil units in Ethiopia are based on statements of Tadele Amare (Co-Author, Researcher at the Amhara Regional Agricultural Research Institute).

Acrisols A

Acrisols develop out of quartz rich rock and are shaped by illimerisation (clay migration). They are strongly weathered and contain a big amount of kaolonite. The old soils have lost most of the bases because of leaching. The acidic and highly phosphor fixing soils dominate in the humid tropic and sub-tropic latitudes. In Ethiopia they occur in the sub-humid and humid regions of the western and southern part. Acrisols

build generally nutrient-poor sites. Therefore these soils are mostly covered by forests or pasture.

Table 6-1: Occurence of Major soil classes in Ethiopia and Eritrea in million ha (Bull 1988). Zones: CEN=Central (Shewa), NW =Northwest (Gojam and Gonder), W =West (Kefa, Ilubabur and Wellega), S =South (Sidamo and Gamo Gofa), SE = South East (Arsi and Bale), E = East (Harerge), NE = North East (Welo), N = North (Eritrea and Tigray)

Soil class	**Administrative zone**[a]							
	CEN	NW	W	S	SE	E	NE	N
Nitisols	0.8	3.7	8.1	1.2	0.4	0.1	0.1	-
Cambisols	1.3	0.8	0.5	3.1	1.8	1.2	1.0	2.3
Vertisols	1.6	2.7	2.0	1.6	1.6	1.2	0.3	0.9
Luvisols [b]	0.4	2.3	0.1	1.3	0.7	0.5	0.1	0.6
Fluvisols	0.2	0.1	1.6	1.4	0.2	1.0	0.2	1.3
Xerosols	-	-	-	0.9	0.9	2.5	-	1.1
Solonchaks	0.1	-	-	0.1	-	-	-	-
Acrisols	-	0.4	1.3	0.1	-	-	-	-
Others	0.2	0.1	0.4	-	0.3	1.3	0.1	-
Total	4.6	10.1	14	9.7	6.1	9.0	2.9	7.2

Cambisols B

Cambisols are young soils that have a cambic B-horizon. The presence of appreciable quantities of weatherable minerals and the absence of any sign of advanced pedogenesis reflect an early stage of soil formation (Driessen and Dudal 1991).The humus surface layer goes continuously over in a brown colored B-Horizon. Cambisols are characterised by slight or moderate weathering of parent material and by absence of considerable quantities of illuviated clay or organic matter, aluminium and iron compounds. Cambisols develop in all climates in mountainous terrain. They make generally good agricultural land and are intensively used (Driessen et al. 2001).

In Ethiopia these soils have large variations being either acidic or basic; some are highly productive while others may be poor in fertility. Cambisols are one of the productive soil units of the country. Cambisols occure often in slopes where erosion is common. They may occur in many agro-ecological sub zones but mostly in the north eastern Rift Valley escarpments. Humic, calcaric, eutric and luvic cambisols are found in Amhara region.

Ferralsols F

Ferralsols are intensively and deeply weathered soils. Because of the accumulation of Fe- and AI-Oxides, their B-Horizon appears strongly red, brown or yellow. These soils

develop as typical forest soils. Ferralsols are formed out of silicatic or carbonatic rock during long time periods. Many sites are relictic and subjected by strong erosion due to changed climate conditions. Yields of Ferralsols decrease after a few years of agricultural use, because the nutrients are washed out rapidly.

Lithosols I

Lithosols are poorly developed soils formed out of solid rock (Payer 1998). They exist not continuous and represent an initial state of soil development. The thin (less than ten cm) soil-layer lies straight above the solid rock. The often stony and drysoils are characterised by low water holding capacity. Agricultural usage is not possible.

In Ethiopia Lithosols are mainly found in the Wello, Tigray, Gonder, Ogaden hill and Northern Shewa areas.

Fluvisols J

Unregulated rivers flood periodically the surroundings in their valleys. Fluvisols are soils of such rivers. They occur on flat ground at the bottom valleys along the streams. The fertile soils develops from recent alluvium. Through floods regular exchange of sediment or nutrients occur. Fluvisols are often enriched with oxygen. Due to seasonal flooding big changes in humidity occur. Natural vegetation is forest, but these soils are also used for agriculture.

In Ethiopia drainage problems are often solved by making cumber beds for the main season. Fluvisols are very productive in the small rainy season and in the off-season if irrigation is possible.

Nitosols N

Nitisols are clay rich, illimerisated soils of shining red color with deep (more than 1,5m) and monotonous profiles. They formed out of silicatious rock, for example basalt or schists. Most silicates are weathered but in contrast to Ferralsols, weatherable minerals are still available. Roots of vegetation can penetrate deeply in the loose soil. Well ventilation and mean supply of nutrients makes these soils to favourable sites for agricultural use. The acidic, high P-fixing and well drained soils are responsive to fertiliser application with good management of leaching and erosion.

Nitisols occur from sub-moist to humid agro-ecological zones. In Ethiopia they can mostly be found in Wellega, Ilubabor, Keffa, Jima, Sidamo, Southern Shewa and Gojam.

Arenosols Q

Arenosols are sandy soils with low formation of horizons. These soils exist mainly in deserts but also in more humid climate for example on coastal dunes. Because of missing vegetation the percentage of humus is low. Arenosols are often salinated,

caused by the minimal precipitation. In contrast to ribs, where often desert plaster with gravel and stones appears, the surface in depressions is often covered by loess. Usage for agriculture is only possible with intensive irrigation and fertilisation.

In Ethiopia these soils are mostly found in river gorges, canyons, and plains.

Regosols R

Regosols developed out of lime free, unconsolidated parent materials from different types of rocks. They usually consist of shallow sandy clay loam and sandy loam textured soils with excessive drainage. Because of the low depth and high erodibility Regosols are not well-suitable for agricultural use. Regosols are deficient in phosphorus.

Regosols are often found on sloping topography, commonly in the drier areas of eastern Ethiopia.

Andosols T

Andosols occur in volcanic regions all over the earth. They are built out of young volcanic ash. The upper soil is loose, black colored and rich of humus. The brown red deeper horizons are partly hardened. The high water capacity and the stable and porous structure make these soils to favourable sites for plants.

In Ethiopia this soil can be found in the highlands as well as in the Rift Valley system.

Vertisols V

Vertisols are soils with intensive pedoturbation, shrinking and swelling are the dominant processes. The pedoturbation affects deep and wide cracks in dry periods in the black to grey coloured soils. These cracks are called "slickensides". The shrinking and swelling can also lead to the formation of a micro relief with rises and deepening (Gilgai).

Vertisols appear preferential on clay rich sediments or weathered basalt in depressions with low drainage or on plains with warm climate and changing humidity.

Vertisols of Ethiopia have mostly more than 40 percent clay on the surface and up to 75 percent to the middle of the profile (Asnakew Woldeab 1988). Agriculturale usage is difficult. It needs intensive drainage work to handle the changing dry and wet conditions. With a good drainage system double cropping is possible. Vertisols showed good responses to nitrogenous and phosphorous fertilisers. Due to the widespread occurence of weathered basalt, they cover huge areas of the country, mainly in Gojam, Shewa, Arsi, Bale, in the bottomlands of Harerge highlands and in Gambela.

Xerosols X

Xerosols are humus-poor semi-desert soils. In Ethiopia they occur in the semi-arid regions and are characterised by low organic matter content and high salinity. In addition low contents of phosphorus, magnesium, potassium, iron, zinc and high gypsum content are typical chemical characteristics of these soils.

Yermosols Y

Yermosols are Arenosols with yermic characteristics. The aridity formed stony plaster with desert varnish or vesicular crusts at the surface. Desert varnish is a black-brown surface layer formed out of Fe- and Mn-oxides.

Solonchaks Z

Solonchaks are salty soils. The salt can originate from the atmosphere (dust or solved in rainwater), from the sea or from salty rock. The salt was redistributed and enriched in depressions by water. Solonchaks can develop also artificial through irrigation. Usage of these soils is not possible until the salt can be washed out.

In Ethiopia these soils are concentrated in lowland areas such as the Afar region.

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7 Hydrology of Ethiopia

Compiled by Andres Strebel

Abstract

Only little general information is available about the Hydrology of Ethiopia. There are quite many Ethiopian case studies with hydrological issues, but nearly no country wide information. One reason is that important hydrological parameters like the amount of rainfall and surface runoff depend on location and altitude and are spatial and temporal highly variable in Ethiopia. Even though Ethiopian hydrological processes are hardly influenced by variability and irregularity it's known that only the western part of the country has a big water surplus and is very important for the national surface water potential. The major part of western Ethiopia belongs to the *Nile Basin*, one of the four Ethiopian major river basins. Even though all of the four major basins contain big rivers or lakes in an international view the *Nile Basin* is the most important. It spends the major part to the lower Nile which drains through Sudan and Egypt. These countries are strongly depending from the Highland water. The impressive surface water potential of Ethiopia is very important for the riparian countries but up to now it is only little developed for Ethiopian domestic uses.

7.1 Drainage

The drainage pattern is the result of the uplifting of the Ethiopian landmasses during the Tertiary Period, which created the *Rift Valley* and consequently the two separated Highlands (Westphal 1975: 16). The two Highlands have different names in the literature and should be named for this paper north-western and south-eastern Highland. All the Ethiopian rivers originate in the Highlands and flow in many directions. The general slope of the north-western Ethiopian Highlands is towards the Sudan (*Nile Basin*), whereas that of the south-eastern Highlands is towards the Indian Ocean (*Shebelli-Juba Basin*). According to this, Ethiopia forms the divide between the Mediterranean and the Indian Ocean basins. Along the (north) eastern edge of Ethiopia Highlands a major watershed separates the drainage westwards to the Sudan from the drainage (south) eastwards into the *Rift Valley*. Similarly a major watershed following the crest of the south-eastern Highlands separates the drainage south-eastwards towards the Indian Ocean from the drainage north-westwards into the *Rift Valley* (Westphal 1975: 16). According to the FAO there are four major drainage systems to be separated (Aquastat 2005: 3):

- The ***Nile Basin*** drains the major part of the north-western Highlands by north-westwards flowing rivers. This basin, with the biggest water supply of the four major systems, covers 33 percent of the Ethiopian country. It's including the *Abbay* or Blue Nile, *Tekeze* and *Baro Akobo* basins.
- The ***Shebelli-Juba Basin*** drains the major part of the south-eastern Highlands towards Somalia and the Indian Ocean. It also covers 33 percent of Ethiopian area. It's including the *Wabe Shebele* and *Genale Dawa* basins.
- The ***Rift Valley*** drains the south-eastern part of the north-western Highlands and the north-western part of the south-eastern Highlands, including the *Danakil, Awash, Omo Gibe* and C*entral Lake* basins and covers 28 percent of the country.
- The **North-East Coast** including the *Ogaden* and *Gulf of Aden Basins* covers six percent of the country.

Figure 7-1: Overview of the drainage basins of Ethiopia. The big letters are standing for the Major basins: A=Nile Basin, B= Rift Valley, C= North-East Coast, D= Shebelli-Juba Basin (WWAP 2006, major basin modified by Strebel)

7.2 Rivers

The most famous Ethiopian river, the *Abbay* also known as the Blue Nile, drains into the Mediterranean Sea together with the White Nile (Mesfin Wolde-Mariam 1972: 53). The *Abbay* and its tributaries account for two-thirds of the Nile River flow below Khartoum in Sudan. Because of the general westward slope of the Highlands, many large rivers are tributaries of the Nile system, which drains an extensive area of the central portion of the plateau. The Blue Nile, the *Tekeze* and the *Baro* are among them and account for about half of the country's water outflow (Nation Encyclopedia 1991: 2). The *Awash*, nearly 700 km long, winds through the northern half of the *Rift Valley* towards the *Gulf of Aden* and is ending in a series of lakes at the boarder to Djibouti (Mesfin Wolde-Mariam 1972: 53). In the *Awash* river the Ethiopian government has built several dams to generate power and irrigate major commercial plantations (Nation Encyclopedia 1991: 2).The *Omo*, another important Ethiopian river, rises from south-western plateau and flows southward to fill *Lake Turkana* (Lake Rudolph). The *Wabe Shebele* flows through Ethiopia and Somalia for more than 2488 kilometres and flows parallel to the coast for some time until it sinks into a marshy region of Somalia, where its water fully evaporates. Only the *Juba* receiving considerable water from its major tributaries, the *Dawa*, the *Genale* and the *Gestro (*or *Weyb)*, flows through the dry areas of Ethiopia and Somalia to deliver its waters perennial into the Indian Ocean (Mesfin Wolde-Mariam 1972: 53).

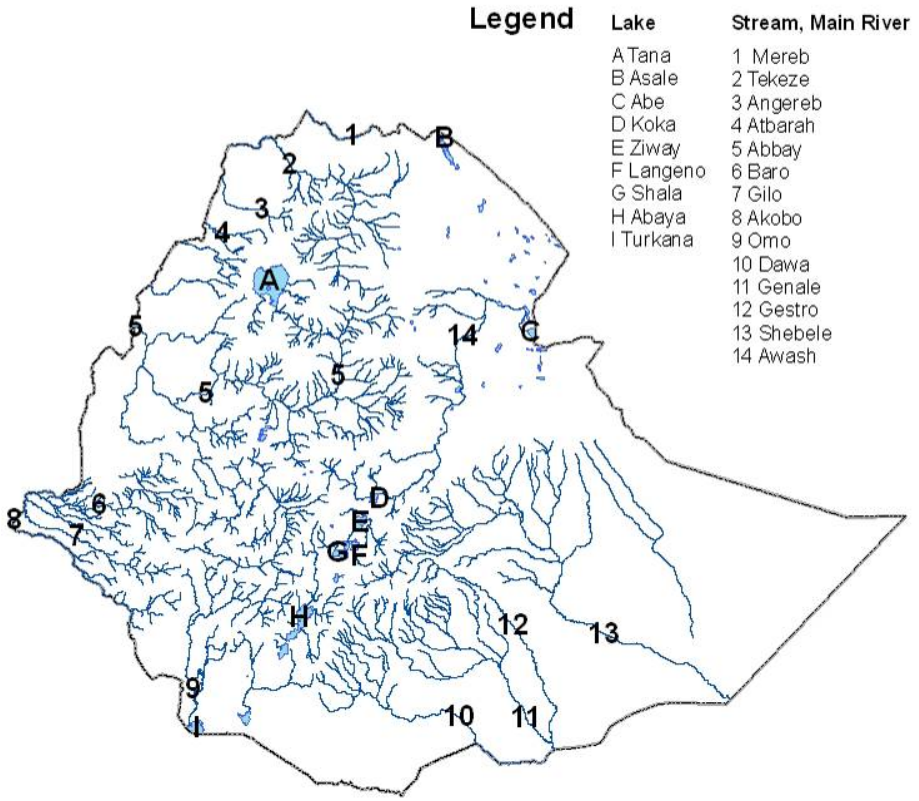

Figure 7-2: Important Ethiopian rivers and lakes (own illustration based on data from EthioGIS (2006).

The following table (Table 7-1) shows the annual runoff from the different Ethiopian basins. Runoff amounts from other authors deviate sometimes a little from this table data. Its shows that this hydrological data are not hundred percent verified and that they have to be reflected a little critical.

Table 7-1: Amount of runoff of the most important Ethiopian river basins (Aquastat 2005, modified by Hans Hurni 2006)

Major drainage system	River basin	Area[1]	As % of total area	Annual runoff	As % of total runoff	Annual rainfall	Annual runoff	As % of the rainfall
		(ha)	(%)	(km^3/yr)	(%)	(mm)	(mm)	(%)
Nile Basin		**36'881'200**	**32.4**	**84.55**	**69.0**	**1'400**	**229**	**16.4**
	Abbay	19'981'200	17.6	52.60	42.9			
	Baro-Akobo	7'410'000	6.5	23.60	19.3			
	Tekeze/Atbarah	8'900'000	7.8	7.63	6.2			
	Mereb	590'000	0.5	0.72	0.6			
Rift Valley		**31'764'000**	**27.9**	**29.02**	**23.7**	**800**	**91**	**11.4**
	Awash	11'270'000	9.9	4.60	3.7			
	Danakil	7'400'000	6.5	0.86	0.7			
	Omo-Gibe	7'820'000	6.9	17.96	14.7			
	Central Lake	5'274'000	4.6	5.6	4.6			
Shebelli-Juba		**37'126'400**	**32.7**	**8.95**	**7.3**	**400**	**24**	**6**
	Wabe Shebele	20'021'400	17.6	3.15	2.6			
	Genale-Dawa	17'105'000	15.1	5.80	4.7			
North East Coast		**7'930'000**	**7.0**	**0.00**	**0.0**	**200**	**0**	**0**
	Ogaden	7'710'000	6.8	0.00	0.0			
	Gulf of Aden	220'000	0.2	0.00	0.0			
Total		**113'701'600**	**100.0**	**122.52**	**100.0**	**821.6**	**107.4**	**13.1**

The areas are estimates and the total area is slightly different from the total area of the country, which is 111'043'000 ha. This last figure should be considered as being the correct one nationally

Most of the rivers in Ethiopia are seasonal and about 70 percent of the total runoff is obtained during the period June-August (Auqastat 2005: 3). This means that the runoff of the Ethiopian rivers is fluctuating extremely and often limited to the time of rainfall. Therefore only some Ethiopian rivers are perennial. Many rivers in the dry areas have only flash flood flow a few hours during storm and dry up in a very short period. The limited retention capacity of the landscape and the high intensity of rain are the reasons for the direct and fast runoff reaction of the rivers to the rainfall. Most of the Ethiopian rivers are short and run through deep and narrow canyons in their upper course (Westphal 1975: 17). They are frequently interrupted by a series of falls and rapids. As a result almost none of the Ethiopian rivers are navigable (Mesfin Wolde-Mariam 1972: 53). Extensive areas with an arid climate profit from the highland rivers. Most of them dry up or are lost in swamps when they reach the arid plains (Westphal 1975: 17), only the *Juba* and the Blue Nile reach the Ocean.

The Ethiopian rivers have been major factors in the sculpturing of land. The present landform of Ethiopia (to a large extent) owes its characteristics features to the rivers. The rivers have deeply incised the land, producing steep walled valleys and broken plateaus (Mesfin Wolde Mariam 1972: 53).

According to Mesfin Wolde Mariam (Mesfin Wolde Mariam 1972: 53) the Ethiopian rivers have had also an enormous impact on the people. “They have promoted regionalism. In these sense the river is a factor of unity and separation, those that are united by it being also separated from it.“

7.3 Lakes

Ethiopia has several lakes with an area of about 7000 km² (Aquastat 2005: 4). Some lakes situated in the Highlands play an important role in storing water and feeding it to the rivers (especially *Lake Tana)*. But never the less the most Ethiopian lakes are located in the Lowlands. Most of them are closed basins and function as final collectors. According to Huffnagel et al. (1961), they often have the character of swamp and salt water areas (e.g. *Lake Chew Bahir, Lake Abe, Lake Asela*) (Westphal 1975: 17).

The biggest Ethiopian lake is the *Lake Tana* in the northwest of Ethiopia with an area of 3'600 km^2 (compare Figure 7-3). Except of *Lake Tana* nearly all the Ethiopian lakes are found in the *Rift Valley*. In the most northern part of the *Rift Valley*, in the *Danakil Depression*, that in places is 115 meters below sea level and one of the hottest places in the world, coastal hills drain inland into saline lakes (*Asela, Afrera*), from which commercial salt is extracted (Nation Encyclopedia 1991: 2). A little southern, near the western boundary of Djibouti, the *Awash* River disappears also in saline lakes (*Gemeri, Afambo, Adobed, Abe*). The southern half of the Ethiopian segment of the *Rift Valley* is dotted by a chain of relative large lakes (*Koka, Ziway, Abijata, Langeno, Shala, Awasa, Abaya, Chamo, Chew Bahir, Turkana* or Rudolph). The most of them are volcanic lakes, some hold freshwater, fed by small streams from the east, others contain salts and minerals. *Lake Shala* is the biggest impact lake and by reaching a depth of 250 meters the one with the biggest depth in Ethiopia, the depths of the others lake in Ethiopia vary from four to 85 meters (Nation Encyclopedia 1991: 2*). Lake Langeno* is one of the few lakes of the country where bathing doesn’t bear the risk of Bilharziosis disease because of the high content of soda (Wikipedia 2006: 3).

7.4 Some aspects of the water balance

The average annual rainfall of Ethiopia according to the Aquastat - Food and Agriculture Organisation’s (FAO) information system on water and agriculture - is 848 mm (Aquastat 2005: 1). The amount of rainfall is very irregular and varies from about 2000 mm per year over some pocket areas in southwest Ethiopia to less than 100 mm over the *Afar Lowlands* [1]in the Northeast (Aquastat 2005: 1). The rain is determined by the west monsoon, so the most rain falls in the West and only little in the ”rain shadow” areas. However, in most of the parts of the Highland the annual average

1 Lowland in the Northeast of Ethiopia

is well over 1'000mm (Ethiopian Tourism Commission: 17). Rainfall of Ethiopia is highly erratic, and most rain falls intensively, often as convective storms, with very high rainfall intensity and extreme spatial and temporal variability. The result is that there is a very high risk of droughts and intra-seasonal dry spells (Aquastat 2005: 1/2). The annual distribution of the rainfall is very different in Ethiopia. In the south-western part of the Highlands rainfall is possible the most of the year, this is also the Ethiopian region with the biggest rainfall amount in the year. In the other parts of the Ethiopian Highlands the most of the rain falls in summer (June-September so called *"Krempt"*[1] rains), sometimes there is rainfall also in spring (March-Mai so called *"Belg"*[2] rains). In the deeper regions of Ethiopia, the *Rift Valley* and the south-eastern part, rainfall amount is smaller. In the south-eastern part the little rain falls in spring (March-Mai) or in the fall (August-November), in the eastern *Rift Valley* there is summer and spring rain existing but in small amounts (EMA 1988: 18).

The mean annual potential evapotranspiration varies between 1700-2600 mm per year in arid and semi-arid areas (most of the Lowlands) and 1600-2100 in dry subhumid areas (most of the Highlands) of Ethiopia (Aquastat 2005: 1).

The map below of mean annual water surplus is reflecting the spatial differences of rainfall amounts and evapotranspiration in Ethiopia. It is "the sum of monthly excesses of rainfall over potential evapotranspiration when soil moisture storage is assumed to be at field capacity" (EMA 1988: 18) According to the inflow-outflow hydrological equation (surface runoff (surplus) = precipitation – evapotranspiration – subsurface drainage - change in soil moisture storage) the water surplus is approximately equal to surface runoff, by ignoring the small part of subsurface drainage (EMA 1988: 18) and according to the assumption that the soil is saturated (100mm). So in the south-western Ethiopian parts with a big annual water surplus more surface runoff takes place than in parts with a smaller water surplus. However it should be noted that the water surplus values shown on the map indicate only broad and relative values and not absolute amounts of surface runoff.

7.5 Water resources and use

According to the Aquastat Ethiopia is endowed with a substantial amount of water resources. The annual actual renewable water resource is 122 km^3. The surface water potential of the country is impressive, but little or rather none developed (Aquastat 2005: 3). According to the World Water Assessment Programme of UNESCO only three percent of the 122 billion m^3 renewable water potential remains in the country! It is estimated that 54.4 billion m^3 of surface runoff and 2.6 billion m^3 of groundwater can be developed for utilisation. Currently less than five percent of surface water potential is used for consumptive purposes (WWAP 2006).

1 Summer rain in Ethiopia

2 Spring rain in Ethiopia

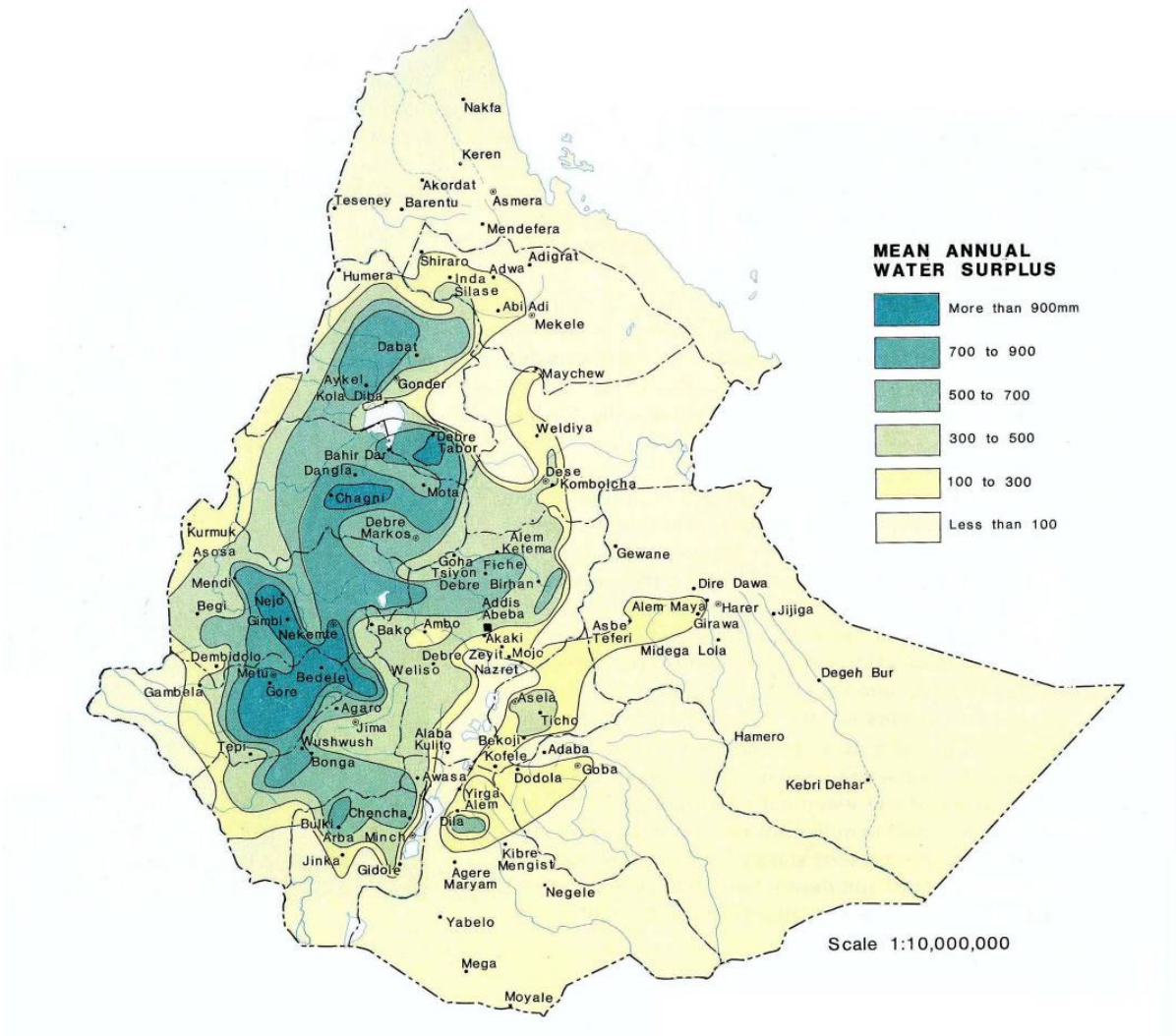

Figure 7-3: Mean annual water surplus (Gemechu D., Addis Abeba University in EMA 1988: 18).

The considerable number of large rivers is a big potential as sources of hydroelectric power and as water sources for irrigation (Nation Encyclopedia 1991: 1).

Considering this Ethiopia has a high potential in constructing reservoir dams. Up to today nine medium to large dams with a total capacity of 3.5 km^3 exist in Ethiopia. Four of them are used for water supply to the city of *Addis Abeba* and the town of *Gonder*, two only for hydropower generation, one for irrigation and power production and two reservoir are used for irrigation only (Aquastat 2005: 4).

Even though irrigation has a history in Ethiopia which dates back several centuries the present (2001) irrigation area of Ethiopia with nearly 290'000 ha is only 11 percent of the economic irrigation potential of 2.7 millions ha according to the FAO (Aquastat 2005: 4,5).

The groundwater potential of Ethiopia is not known with any certainty, but so far only a small fraction of the groundwater has been developed and this mainly for domestic water supply purposes (Aquastat 2005: 4).

7.6 International interest in the Nile basin

Ethiopia is the water tower and roof of north-eastern Africa (Mesfin Wolde Mariam 1972: 52). Most of the rivers of Ethiopia originate within the country and flow across the borders to neighbourhood countries, thus becoming transboundary or international rivers. Sharing the water resources of these transboundary rivers is very challenging, particularly for the Nile tributaries (*Abbay, Atbarah/Tekeze* and *Baro*) with the downstream riparian countries Sudan and Egypt (Aquastat 2005: 4). This countries are afraid that river projects upstream in Ethiopia reduce the total amount of runoff to their countries or change the pattern of the seasonal distribution (Mesfin Wolde Mariam 1972: 55). The growing water need in these ”dependent” countries of the Nile basin increases the problem additional.

“Seasonal floods from the Ethiopian and Eritrean highlands and plateau have been estimated to contribute approximately 86 percent of the total annual supplies of water to the lower Nile, estimated at 84 billion m^3/yr at Aswan in Egypt” (El-Swaify and Hurni 1996: 7 referring to Mesfin Abebe 1994 and Said, 1992). The *Atbarah* and the Blue Nile rivers are the primary deliverer of nearly 53% of these seasonal waters, with an average of 11 billion m^3/yr for the *Atbarah*, and 49 billion m^3/yr for the Blue Nile[1] (El-Swaify and Hurni 1996: 7 referring to Conway and Hulme 1993). The water from these two rivers is primarily used for irrigation in the two semiarid-arid countries of Egypt and Sudan. About 85 million people in these lowland countries are directly dependent on highland waters (Hurni et al. 2005: 1). This explains the importance of the upstream water for Sudan and Egypt and their worries about a reduced runoff from Ethiopia. But according to Hurni et al. the surface runoff (and sediment yield) from the Ethiopian and Eritrean highlands into the upper Nile Basin have most probably increased in the long term due to intensified land use and land degradation induced by population increase, when seen in a historical perspective. This high runoff rate is comforting for Sudan and Egypt but negative for another 90 million people living in the upper Nile basin which are influenced by dramatic soil erosion

As a result of the erosion the international rivers carry beyond the borders of Ethiopia not only water, they also transport valuable soil as well (Mesfin Wolde Mariam 1972: 55). Even though according to Hurni et al. the present high-input and very productive agriculture in the Nile Valley and Delta is not as much dependent from these fertile sediments as the old Egypt low-input agriculture was. The Sediment deposition is today more a threat for usefulness and longevity of water storages. El-Swaify and Hurni estimate that the two tributaries of *Atbarah* and *Abbay* contribute over 90 percent of the Nile's sediments, although their catchment area is with 332’000km^2 only about 16 percent of the Nile Basin (El-Swaify and Hurni 1996: 7). This shows that the erosion rates on lands comprising the major catchment for the both river basins are very high. Complementally it has to be mentioned that not only this two basins are negatively

1 Be aware that the table of aquastat (amount of runoff of the most important Ethiopian rivers basins) in subhapter 7.4 deviates a little from these informations.

influenced by soil erosion in form of water erosion. The soil erosion through water is the most dangerous ecological process observed in Ethiopia according to Hurni (Hurni 1986: 1).

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8 Vegetation and wildlife of Ethiopia

Compiled by Franziska Grossenbacher

Abstract

The extraordinary vegetation and wildlife diversity of Ethiopia suffer of the vast human impact. In the last centuries, the major part of the mountain forests has been removed and consequently the habitats of the local animals have been reduced in size. Especially the endemic species with small populations belong to the most endangered animals in the world and need to be protected, as for example the Walya ibex, the Ethiopian wolf and the Gelada baboon.

8.1 Introduction

The highlands of Ethiopia represent a unique natural heritage of world importance due to its high level of endemism. The mountainous region of Ethiopia is extensive and spans a great range of climate. This extensive mountainous region and the great span of climate both favour the creation, surviving and differentiation of endemic species in flora and fauna. But the highlands of Ethiopia are also a striking example of how human activities can reduce the richness of ecosystems with its disastrous consequences like degradation of soils. The originally rich ecosystems convert into exhausted and unproductive areas. Consequently, gene pools get lost and the genetic diversity diminishes. Today, most of the endemic animals in the Ethiopian highlands are confined to the mountain extremes, i.e. the upper zones of 3000 meters above sea level, which are also known as afro-alpine and sub-afro-alpine mountain regions (Beck 1994: 2f).

In the following sections the wildlife and vegetation of Ethiopia is described.

8.2 Vegetation

The vegetation of Ethiopia can generally be divided into two major regions: the plateaus and mountains with adequate rainfall and moderate or cool temperatures and the lowlands with high temperatures, deficient rainfall and long periods of drought (Last 1963: 55). The human impact on the original vegetation is striking, particularly in the highland area. Taking the Simen Mountain as an example, Hurni (1982: 165) describes that today only a poor rest of 200 km^2 of the original forest which once covered 1600 km^2 has been left over. The remaining patches of forest can be found on

the very steep and for humans inaccessible slopes and around churches or graveyards and most of the originally forested land is now used for cultivation.

8.2.1 Climax vegetation

Figure 8-1 provides an overview of the different climax vegetation regions that will be explained in the following.

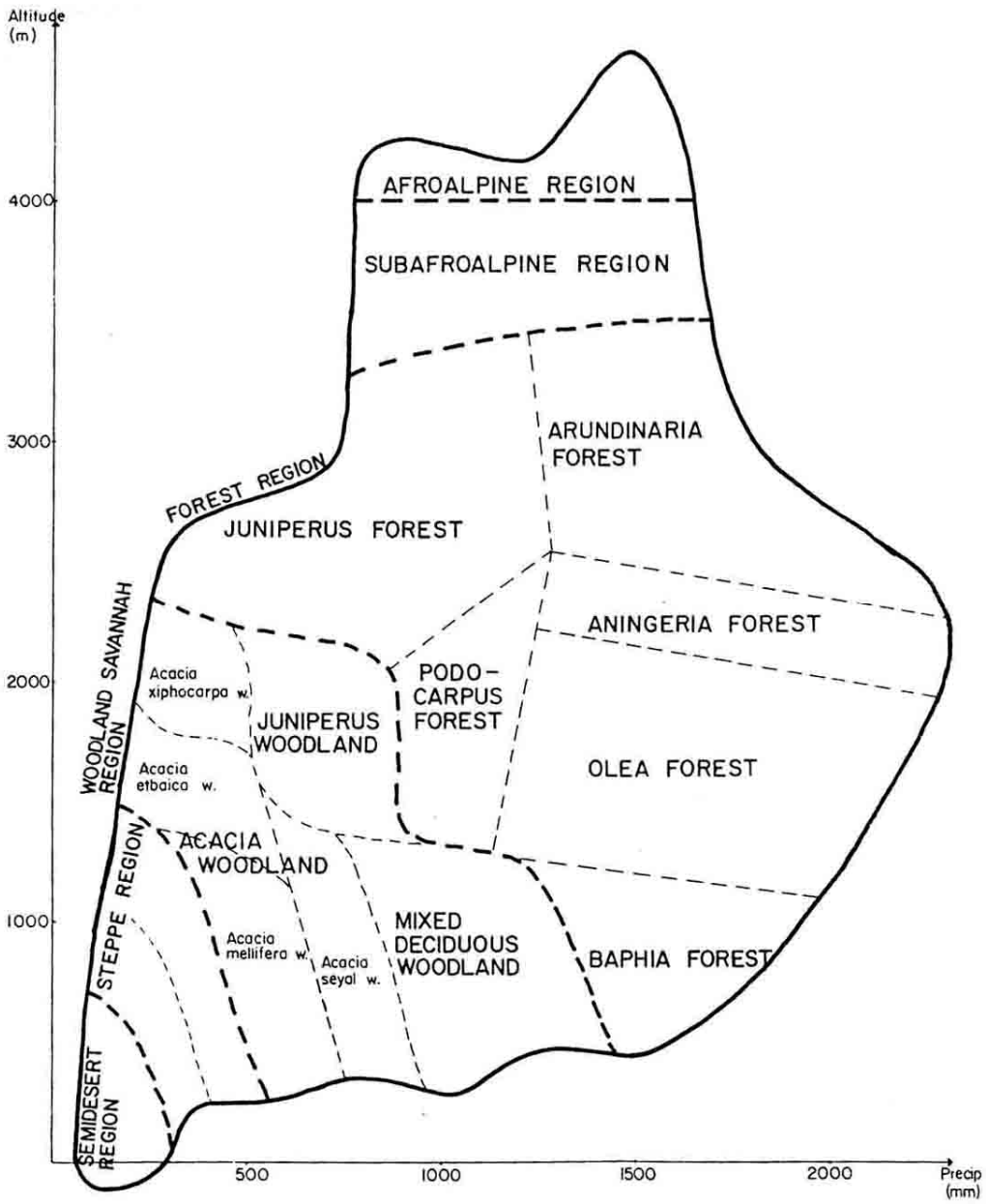


Figure 8-1: Vegetation regions correlated to altitude (temperature and mean annual rainfall (Marklund and Odenyo 1984: 69).

If not else indicated, the section is based on Marklund and Odenyo (1984: 5ff).

Afroalpine region (3800 – 4530 m)

Above the Erica forest on an altitude of 3600 to 3800 m the Erica forest merges into the afro-alpine steppe. The high mountain vegetation resembles Alpine vegetation, but there are differences in plant species. That's the reason why this zone is called "afro-alpine" (Last 1963: 58). The typical bushes and trees are Helichrysum and Lobelia rhynchopetalum, the grasses Festuca and Danthonia. This species are well adopted to withstand the rapid changes in the afroalpine climate with the frosty nights (Hurni 1982: 166).

Subafroaline region (3300 – 3800 m)

The vegetation of the subafroalpine region is adapted to less extreme environment than those of the afroalpine region. The borderline between the montane and the Erica forest can be located between 2900 and 3400 m asl. The Erica and Hypericum trees reach a size up to ten metres (Erica arborea, Hypericum revolutum) (Hurni 1982: 166).

Forest region (450 – 3800 m)

The forest region covers a broad altitudinal range. In the most humid parts it extends from 450 to 3800 m altitude, in the most arid part just from 2300 to 3300 m altitude. Dependent on the altitude, different communities developed:

Juniperus forest (2000 - 3400 m), Hagenia forest in the humid part of the Juniperus forest, Arundinaria forest (2200 - 3500 m), Aningeria forest (1950 - 2250 m), Podocarpus forest (1300 - 2550 m), Olea (welwitschii) forest (1100 - 2200 m) and Baphia forest (450 - 1250 m).

For further explanation, another classification should be presented. Hurni (1986: 166 f) summarises the different literature and own observations and suggests a division of the montane forest following the savannah belt at an altitude of 1700 to 2000 m in three different parts: the lower part mainly covered with Ficus and Acacia (Ficus vasta, Acacia abyssinica), the middle part containing Syzygium and Maesa (Syzygium guineeense, Maesa lancoelata) and finally the upper part characterised as Olea-Juniperus-Hagenia-forest (Olea chrysophylla, Juniperus procera, Hagenia abyssinica).

Woodland savannah region (250 – 2300 m)

The mean annual rainfall varies from 200 to 1400 mm thus the vegetation is adapted to the increased aridity. The woodland savanah region is characterised by a mosaic-like vegetation pattern consisting of open grassland, of grasslands with a more or less dense cover of tress and / or shrubs, and of woodlands, bushlands and shrublands.

A Juniperus woodland covers the mountain slopes between 1300 and 2200 m. In contrast to the Juniperus forest in this community occur many species that are more

thermophile and are restricted to a lower altitude. Therefore the Juniperus woodland is distinguished as a separate community.

The Acacia woodland is found at altitudes between 250 and 2300 m. The communities vary due to the changes in altitude and humidity and are the following: 1800 - 2300 m (200 - 500 mm) Acacia xihocarpa (up to 15m high), 250 - 1800 m (400 - 600 mm) Acadia mellifera (up to 15 m), 800 - 1900 m (200 - 700mm) Acacia etbaica (5-15m), 300 - 1000 m (600 - 1000mm) Acacia seyal (10 m).

The mixed deciduous woodland occupies altitudes between 300 and 1300 m with a mean annual rainfall from 800 to 1400 mm. Most of the tree species are deciduous and remain without leaves during the dry season. As the upper canopy is not very dense, enough light penetrates to support the development of a diversified and dense shrub and ground layer. In the mixed deciduous woodland section are vast areas of lowland bamboo like Oxytenanthera abyssinica and O. borzii. Oxytenanthera abyssinica forms a 6 - 12 m high thicket and has a seven-year growing cycle, after which it flowers, dies off and shoots from the ground again the following year.

Steppe region (100 – 1400 m)

The steppe region occupies altitudes between 100 and 1400 m and receives a mean annual rainfall of 100 - 550 mm. The species occurring in this region are adapted to the deficient rainfall and the heat: they have developed thorns, small leaves, are resin or gum bearing and often aromatic. Geophytes and annuals with a short growing period are also common. The shrubs are not higher than 4 m and of scattered and widely spaced occurrence. In the spaces grow lower shrubs, grasses and other herbs. The common communities are Acacia mellifera - Commiphora scrub and Acacia nubica - Commiphora scrub.

Semidesert region (–130 – 600 m)

The extreme lowland regions of Ethiopia are found in the Danakil depression, along the Eritrean seashore and along the southern border. This region receives a mean annual rainfall of 50 - 300 mm and the growing period is at most one month.

Due to the water shortage the root systems are extremely well developed and create a dense network down to a considerable depth. The plants have also a high salt tolerance. The vegetation is very poorly developed and characterised by patches of low shrubs which are not higher than one metre. between this shrubs are widespread areas with only small tufts of hardy grasses.

Edaphic Climax vegetation:

Wetlands:

The wetlands are mainly found along parts of the lakes, the rivers and the sea. The communities occurring in this region are the perennial Papyrus - Typha swamp, the mangrove swamp along the Red Sea coast with the species Avicennia marina and Rhizophora mucronata as well as the Echinochloa and the Tamarix mannifera marsh. The Echinochloa marshes occur in districts with great changes in water level and the main species is Echinochloa colona. The Tamarix mannifera marsh develops in very dry areas where the salt content of the marshes reaches very high levels.

Riverine forests:

The riverine forests are found along the rivers and vary widely in composition due to changes in altitude and thus temperature. The communities found in this region are the following: Aruninaria riverine forest, Lobelia giberroa riverine forest (found in the Juniperus forest), Phoenix riverine forest (found in the Podocarpus, Aningeria, Olea and Baphia forest), Acacia riverine forest occupying the steppe and woodland savannah regions and Hyphaene riverine forest found along the very low lying rivers in the semidesert region.

Halophytic vegetation

The halophytic vegetation is adapted to stand high salt levels without problems of water regime and characterised by grey-green, succulent, fleshy-leaved herbs. The different communities found in this region are: Halopeplis perfoliata, Arhrocnemum glaucum, Suaeda monoica, Aleuropus lagopoides, Urochondra setulosa and Boswellia rivae.

8.2.2 Present vegetation

The environmental conditions of the plant communities are never stable but always involved in some kind of dynamics such as short-term or long-term changes. The main reasons for these changes are the long-term and short-term climatic changes, the fauna (interaction between animals and herbs) and human influences (man as agriculturalist, pastoralist and the importation of new species). In Ethiopia two important foreign species were introduced that attained good adaptation and grow: The fig cactus (Opuntia ficus-indica) was introduced to northern Ethiopia from where it spread rapidly over vast areas because of the lack of a natural enemy. The Eucalyptus is the second genus that was introduced in the eighteen-nineties in the vicinity of Addis Ababa. They soon became popular due to their fast growing qualities. But the problem of the eucalyptus is the high demand for water that leaded to restrictions on further plantations. Nevertheless eucalyptus forests feature in the vicinity of almost all larger settlements and towns in the Ethiopian highlands (Marklund and Odenyo 1984: 24ff).

This section outlines the present vegetation cover of Ethiopia and is, if not else indicated, based on Marklund and Odenyo (1984: 56ff).

Figure 8-2 compares the extent of the climax vegetation regions with the present vegetation regions. In the following the main vegetation regions are described focussing on the human impact on the vegetation cover.

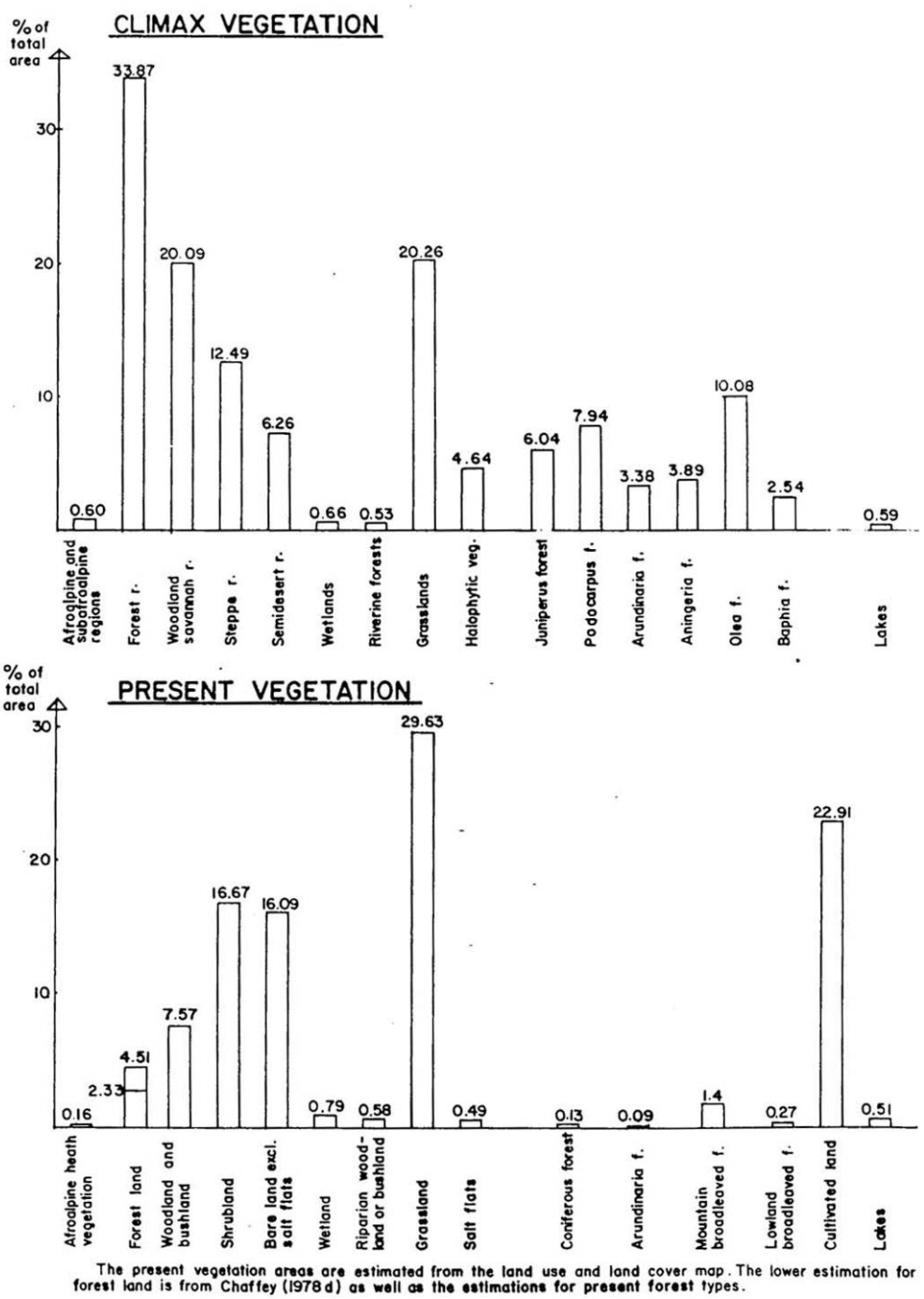


Figure 8-2: Climax and present vegetation (Marklund and Odenyo 1984: 69).

Afroalpine and subafroalpine regions:

Due to human intervention, the trend in the present land cover in this region is decreased ligneous vegetation in favour of open pastures and cultivated land. Cultivation is carried out up to the afroalpine region at an altitude of about 4000 m. Barley its the most important crop at these altitudes. Livestock such as cattle, sheep, goats and horses contribute to the peasant economy and exert a high grazing pressure upon the land cover.

As an example of a highland vegetation Figure 8-3 shows the altitudinal belts of the vegetation in Simen Mountains dependent on slope aspect and gradient.

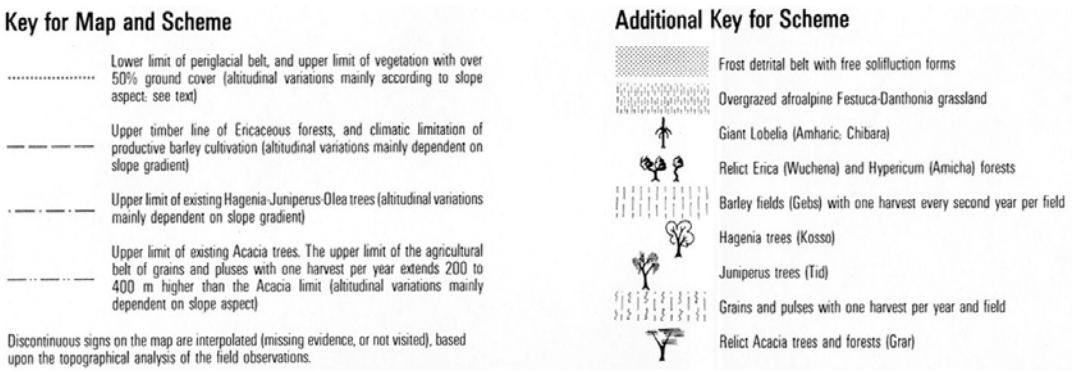


Figure 8-3: Scheme of altitudinal limits and belts dependent on slope aspect and gradient (Hurni 1982: 182).

Coniferous forest region:

The coniferous forest covers the dry part of the forest region. The vegetation consists of Juniperus and Podocarpus forests. The lower region of the Juniperus forest is about 2300 m, of the Podocarpus forest about 1300 m. The uncontrolled deforestation has decreased the forested area to only 0.9 percent of the original.

Broadleaved forest region:

The broadleaved forest region occupies the wet part of the forest region mainly found in southwest Ethiopia. Its lower limit descends to 450 m in the Baphia forest while the upper limit reaches about 3500 m in the Arundinaria forest. The vegetation is differentiated into a succession of Arundinaria, Aningeria, Olea and Baphia. The deforestation is also extensive in this region where only about 11 percent of the originally forested area remained. Grazing and cultivation are the main reasons for the deforestation.

Woodland savannah region:

Also the woodlands show a degenerative aspect due to human impact such as overgrazing.

Steppe region:

The present land cover of the steppe region is fairly similar to the climax. But like the woodland, the steppe region suffers from overgrazing by cattle, sheep, goats and camels.

Semidesert region:

The livestock raising with camels and goats has also an impact on the poorly developed vegetation in this area.

Figure 8-4 is a summary of the important present vegetation regions found in Ethiopia.

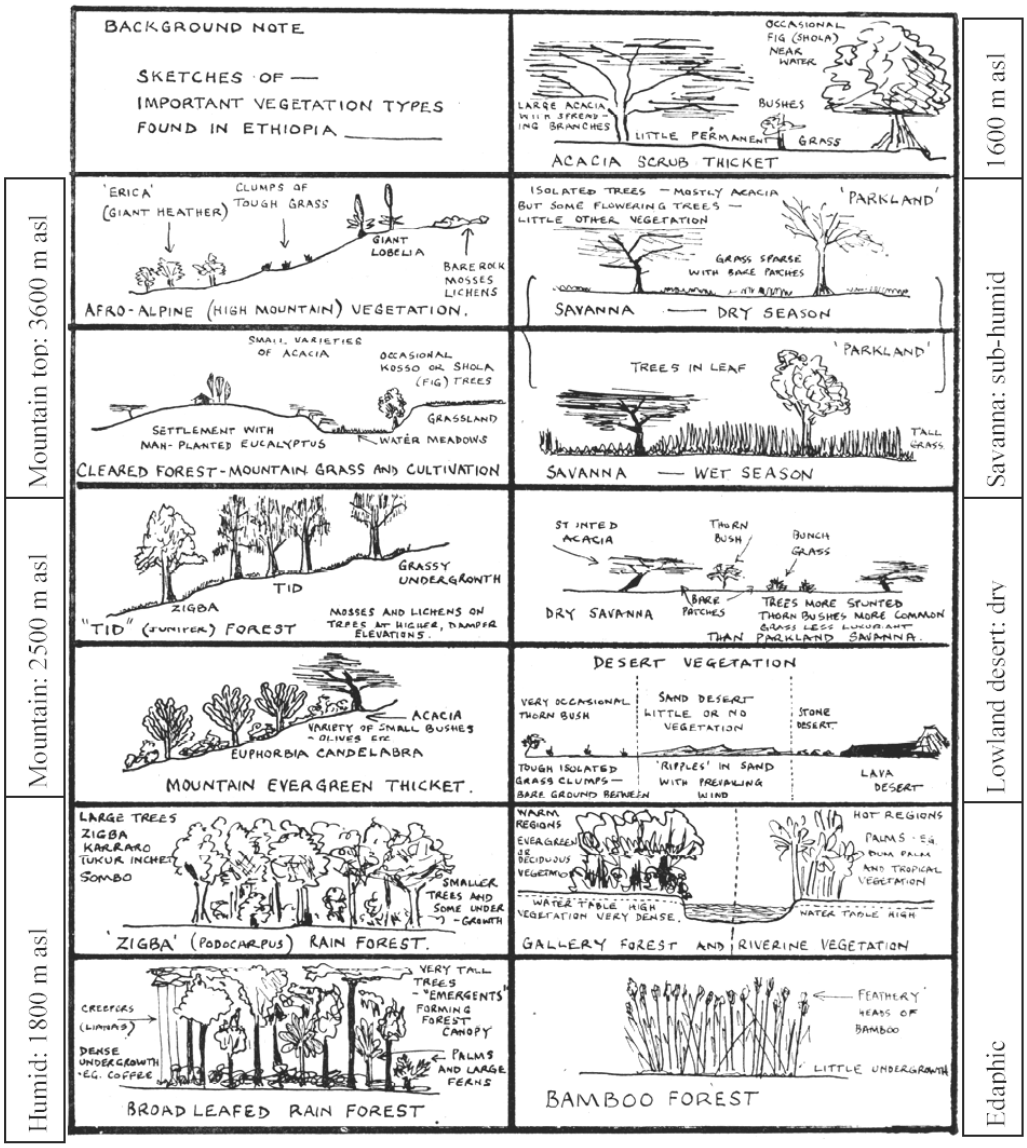


Figure 8-4: Sketches of important vegetation types found in Ethiopia (Last 1963: 56).

8.3 Wildlife

Like the flora, the Ethiopian highland fauna contains an extraordinary richness of species and a high degree of endemic species. The two main reasons for the high endemism are the location between two faunistic regions and the topography - the mountainous islands surrounded by lowlands that act like borders supporting the creation of different isolated ecosystems (Beck 1994: 15f).

There are some species in the Simen Mountains which are endemic in Ethiopia and belong to the most endangered mammals in the world, as for example the Ethiopian wolf, which is endemic in the Ethiopian highlands, the Walya ibex, which is endemic in Simen and the Gelada baboon which is endemic in Ethiopia (Bircher 2006: 20). The Mountain Nyala, an endemic antelope, only occurs in the Bale Mountains National Park in the South of Ethiopia. Other endemic species found in the afroalpine and subafroalpine zones are the Boher Reedbuck and the Minilik's Bushbuck (Beck 1994: 16).

The Simen Mountains in the North of Ethiopia represent a zoologically interesting area because it is located between two faunistic regions – the palaearctic containing Europe, Asia and Northern Africa and the Ethiopian region containing Sub-Saharan Africa (Hurni 1986 in Beck 1994: 15). Today, in the Simen Mountains representatives of both faunistic areas cohabit. As an example the Walya ibex and the Klippspringer can be mentioned. They belong to the same family, the bovidae, but originated in different faunistic regions - the Walya ibex in the Palaearctic and the Klippspringer in the Ethiopian region.

In the lowlands of Ethiopia whit its savannah and desert occurs the typical African fauna like elephants, lions, leopards, cheetahs, giraffes, wild asses, zebras, a great variety of antelopes, wild asses, hippopotamuses, crocodiles and rhinoceroses (Mesfin 1972: 73).

Table 8-1 is a summary of the distribution of some larger mammals also occurring in the Simen mountains. The following list shows and describes these animals. List according to Nievergelt et al. (1998: 63,102) and Bircher (2006: 2).

Table 8-1: Distribution of some wildlife species in different vegetation regions of Ethiopia (Von Rosen 1953; Dorst and Dandelot 1980 in Marklund and Odenyo 1984: 49ff)

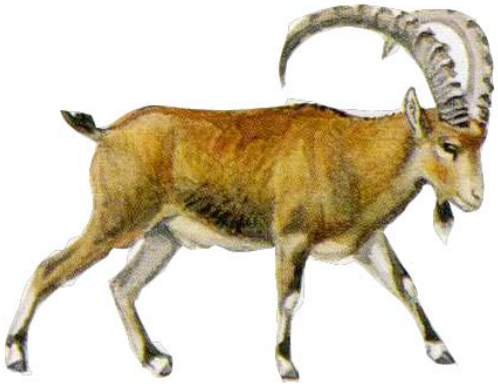
Species	Afroalpine region	Subafroalpine region	Forest region	Woodland savannah region	Steppe region	Semidesert region
Bush pig			x	x		
Bush buck			x	x		
Grimm's duicker				x	x	
Klippspringer		x	x	x		
Walia ibex	x					
Golden jackal						
Leopard		x	x	x		
Serval						
Spottet hyena		x	x	x	x	x
Honey badger			x	x	x	
Gelada baboon	x	x				
Anubius baboon			x			
Hamadryas baboon			x	x		
b-w colobus:			x			
Crested porcupine			x	x		
Rock hyrax						
Ethiopian wolf	x	x				

Suidae

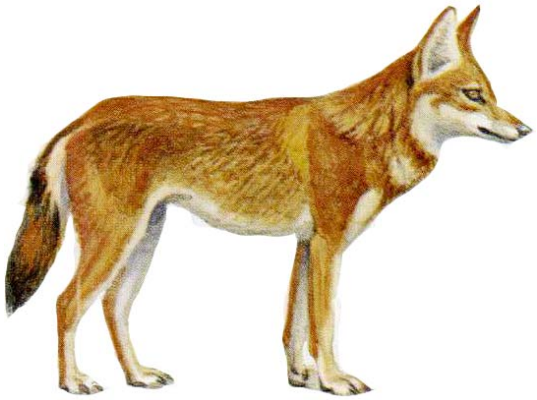
Bush pig *(Patamochoerus porcus)*
Height at shoulder: 63 -75 cm
domestic-pig like animal.
Habitat: high montane forests and thick bush country.
Habits: lives in herds from six to 20 pigs with a large master boar, they are essentially nocturnal and omnivores (eat animals as well as vegetable food).
May be very destructive to crops.
(Dorst and Dandelot 1970: 161, 178f)

Bovidae

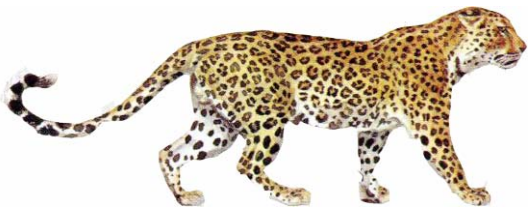
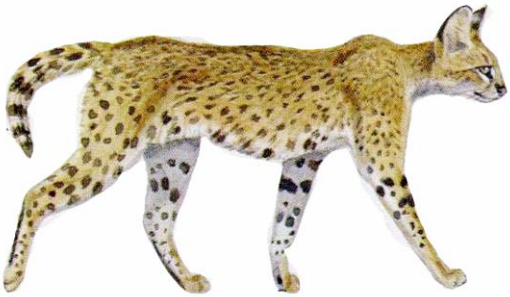
	**Bush buck *(Tragelaphus scriptus)*** Height at shoulder: 70-95 cm females are smaller and without horns. **Habitat:** forest thickets and dense bush, never far from water. **Habits:** live singly or in pairs, sometimes in small family parties. Feed on grass only if it's short. It is among the most pugnacious of the antelopes and if attacked, may be dangerous. (Dorst and Dandelot 1970: 181, 198ff)
	**Grimms's duicker *(Sylvicapra grimmia)*** Height at shoulder: 50 -65 cm female without horns **Habitat:** occurs in a large scale of habitats - from the edge of the desert to the summit of high mountain and almost to the snow line, but not in dense forests. **Habits:** Lives singly or in pairs during the breeding season also in small parties. They are able to survive in areas with dense settlement. Does not usually graze, but feed on leaves, pods, fruits,... (Dorst and Dandelot 1970: 256, 259f)

	**Klippspringer *(Oreotragus oreotragus*** Height at shoulder: 55 cm, rather small antelope female without horns **Habitat:** rocky hills **Habits:** feed on grass, herbs and shrubs Live in small parties Are capable of phenomenal jumps to escape of enemies. (Dorst and Dandelot 1970: 263f, 272) Endemic to Eastern Africa (Bircher 2006: 20).
	**Walya ibex *(Capra ibex walie)*** Height at shoulder: 70 -110 cm Female without horns **Habitat:** Occurring in high mountains, have the same habitat as the Klippspringer **Habits:** Lives in small herds, males often solitary. (Dorst and Dandelot1970: 270f, 273) Endemic in the Simen mountain, they belong to the most endangered mammals in the world. In 1996 Nievergelt estimated a population of 230 individuals (Nievergelt et al. 1998: 46ff)

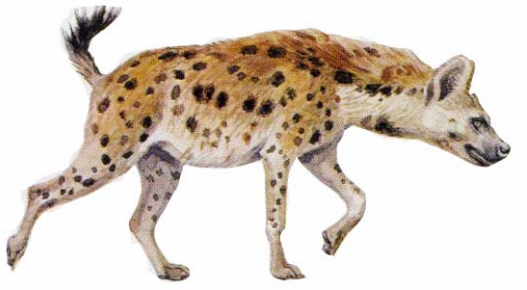
Canidae

	**Golden jackal *(Canis aureus)*** Height at shoulder: 40 cm jackal with proportionally large ears general colour dirty yellow mixed with red and black. **Habitat:** open and wooded savannah **Habits:** usually nocturnal, on cool days also seen by daylight, lives singly or in pairs. Feeds on various animals (particularly rodents) and vegetable matter. As a scavenger, eats every kind of garbage and therefore adapted to the presence of man, enters villages and larger cities at night. (Dorst and Dandelot 1970: 81, 91)
	**Ethiopian wolf *(Canis simensis)*** Height at shoulder: 60 cm dog-like carnivore with fox-like head and long ears **Habitat:** high plateaux. **Habits:** active by day and by night, lives singly or in pairs. Feeds almost exclusively on rodents, sometimes on sheep. Has become very rare in the last years. Endemic in the Ethiopian highlands. (Dorst and Dandelot 1970: 81, 94f)

Felidae

	**Leopard *(Pathera pardus)*** Height at shoulder: 71 cm Big cat with very elegant shape, powerfully built body marked with numerous black spots **Habitats:** very varied habitats from dense forest to open dry country and up to great altitudes. **Habits:** solitary, except during the mating season. Hunt entirely by night. Prey on a wide range of birds and mammals (antelopes, monkeys, baboons, cattle, dogs,...) (Dorst and Dandelot 1970: 140, 144f)
	**Serval *(Felis serval)*** Height at shoulder: 55 cm, large cat, much larger than the domestic cat, general colour yellowish marked with black spots, bands and stripes. **Habitat:** open savannas, bushy country and forest, particularly near rivers, also in high mountain moorlands **Habits:** Nocturnal, prey on various small animals (lizards, rodents, birds) eat also vegetable matter (Dorst and Dandelot 1970: 133, 137f)

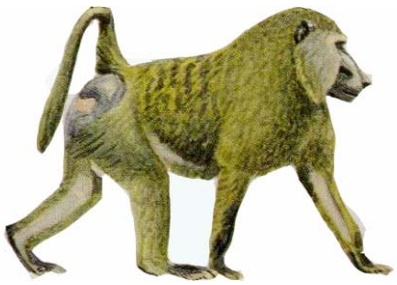
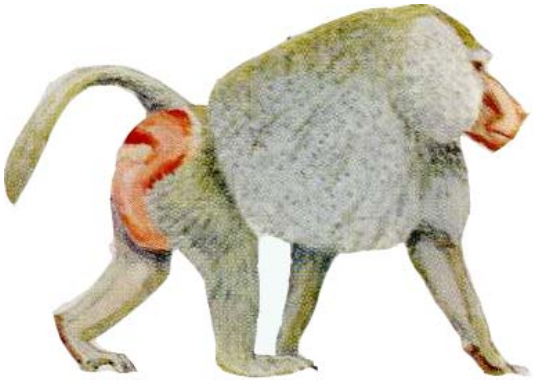
Hyanidae

	**Spotted hyena *(Crocuta crocuta)*** Height: 75 - 90 cm large hyena, very strongly built entirely marked with black spots. **Habitat:** all types of savannah, from sea level up to the snow line. **Habits:** mainly nocturnal, lives singly or in pairs, but also in small packs of up to eight individuals. As a scavenger the hyena follows hunting wild dogs. But it is also a predator, hunting animals up to zebra size. Has few enemies apart from man. (Dorst and Dandelot 1970: 113, 129ff)

Mustelidae

	**Honey badger *(Mellivora capensis)*** Height at shoulder: 25 cm, massive head, small rounded ears, short legs and powerful claws, short bushy tail **Habitat:** from open dry savannah to dense forests **Habits:** nocturnal, lives singly or in pairs Omnivor: feeds on small animals and plants (digging deep holes), very fond of honey (Dorst and Dandelot 1970: 85, 105f)

Cercopithecidae

	**Gelada baboon *(Theropithecus gelada)*** Length up to 76 cm female about half the size of the male **Habitat:** rocky highlands up to alpine pastures, favours steep slopes. **Habits:** form troops up to 400 individuals, divided into smaller groups. The social unit is a one male group, with a large mature male , females with their babies and juveniles. Geladas are almost entirely vegetarians (they eat some insects). (Dorst and Dandelot 1970: 47f, 53) Endemic in Ethiopia. The habitats of the Gelada baboon are vanishing due to human activity. Therefore it is a endangered species (Bircher 2006: 21f).
	**Anubius baboon *(Papio annubis)*** Length up to 100 cm large baboon very heavily built general colour: olive brown. **Habitat:** Savannas (Dorst and Dandelot 1970: 44, 53)
	**Hamadryas baboon *(Papio hamadryas)*** Length up to 76 cm Head and bottom pink, general colour grey females brown and without mane. **Habitat:** dry rocky country (Dorst and Dandelot 1970: 43, 53)

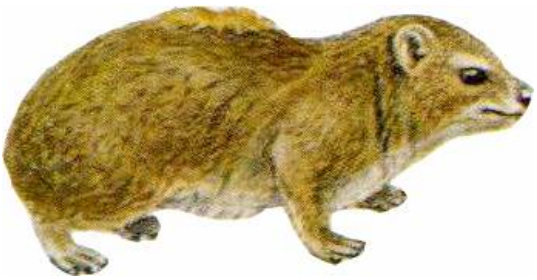
Colobidae

	**Abyssinian Black-and-white colobus *(Colobus guereza)*** Length up to 75 cm (without tail), general colour black with white mantle, extending on the sides from shoulders to root of tail. A wide range of intraspecific variation occurs among them **Habitat:** forests, trees (Dorst and Dandelot 1970: 65, 77)

Hystricidae

	**Crested porcupine *(Hystrix cristata)*** Head and body up to 83 cm thickly covered with long quills, it is capable of raising them when annoyed or attacked, when lodged into the predators flesh, the quills can cause wounds. **Habitats:** all over tropical Africa. **Habits:** nocturnal, live in pairs or groups. (Dorst and Dandelot 1970: 34, 49)

Procaviidae

	**Rock hydrax *(Procavia capensis)*** Length: 45 cm, rabbit-like strange small mammal **Habitat:** very different types of habitats **Habits:** live in colonies up to 50 animals, active by daylight Eats mostly plants and fruit.

8.4 National Strategy for Conservation

This section outlines the Ethiopian Strategy for Conservation and is mainly based on Hurni (1986a).

In view of persistent drought, accelerated soil erosion and degradation, rapid deforestation and wildlife depletion, the Government of Ethiopia has placed top priority on the conservation and development of natural resources. Today, 18,620,000 ha that is 16.4 percent of total land area of Ethiopia is protected (WRI 2003).

Wildlife conservation has been carried out since 1964 through a Wildlife Conservation Department of the Ministry of Agriculture (MoA), and since 1970 by the Wildlife Conservation Organisation (WLCO), with the following main objectives:

1. To conserve wildlife, particularly endangered species;
2. To protect wildlife habitats and areas of ecological significance;
3. To establish conservation areas in the form of national parks, wildlife sanctuaries and reserves (see definitions below);
4. To control wildlife utilisation and products;
5. To create awareness towards wildlife and conservation.

The Ethiopian Wildlife Conservation Organisation's (EWCO, former WLCO) responsibilities included establishing nine national parks, four wildlife sanctuaries, seven wildlife reserves, and 18 controlled-hunting areas between 1965 and 1980 (Jacobs and Schloeder 2001).

Wildlife sanctuaries as opposed to national parks are designed to only protect selected endangered fauna and their habitats, and reserves are areas set aside for eventual later development in national parks.

The establishment of the conservation areas in Ethiopia was not easy because of the political instability. Jacobs and Schloeder summarise the situation in their case study "Impacts of Conflict on Biodiversity and Protected Areas in Ethiopia":

"… the impacts experienced by Ethiopia were a result of the country's engagement in different types of armed conflict that were long in duration. The constraints to conservation - and protected - area management under these conditions were: A continual lack of economic and social development on a countrywide basis, the adoption and enforcement of inappropriate government policies, and widespread hunting due to increased access to weaponry" (Jacobs and Schloeder 2001).

Table 8-2 provides an overview of the impacts on the protected areas, especially the national parks during the 1991 transition period.

Table 8-2: Ethiopia's National Parks, the reasons they were established, occurrence of conservation projects, the period of armed conflict, and a list of damages and losses during the 1991 transition period (Hillman, 1993a,b; Jacobs and Schloeder, 1993 in Jacobs and Schloeder 2001).

Protected Area	**Reason Established**	**Ongoing projects**	**Damage**
Abiyata - Shalla National Park	Protects aquatic birds; two valley lakes	Biologist training project, WCS Infrastructure improvements, UNDP and WCS	Infrastructure looted and destroyed, government vehicles burned
Awash National Park	Protects the Beisa Oryx, Soemmering's Gazelle and Swayne's Hartebeest	Development of a management plan, WCS	No damage and no reported poaching
Bale Mountains National Park	Protects endemic Mountain Nyala, Ethiopian wolf, and giant mole rat; also protects a rare Afro-alpine habitat and moist highland forest	Conservation research for the Ethiopian wolf, WCS and WWF. Infrastructure development project, WWF	Livestock control fences were cut, all outposts were destroyed, Mountain Nyala and wolves were shot
Gambelia National Park	Protects Nile Lechwe, white-eared kob and whale-headed stork in extensive swamp habitat		Infrastructure and vehicles were destroyed
Mago National Park	Primarily for protection of buffalo, giraffe, and elephant	Infrastructure improvements, WCS and WWF	Park was abandoned by staff and store and houses were looted
Nechisar National Park	Protects Swayne's hartebeest and Bruchell's zebra; also portions of two rift valley lakes in the park that protect crocodile and hippopotamus		Outposts located far from the headquarters were damaged and looted; incursions into the main grassland plain by the Gugi agro-pastoralists.

Omo National Park	Protects an extensive grassland wilderness and numerous lare mammal species: among the most important are common eland, buffalo and elephant	Development of a management plan, EWCO Infrastructure improvements, WCS and WWF	No infrastructure damage but poaching increased
Simen Mountain National Park	Protects the Walya ibex and Ethiopian wolf	Development of a management plan, UNDP UNESCO listed Simen Mountains as a World Heritage Site in 1978	Simen National park was inaccessible between 1984 and 1991; all park infrastructure was destroyed
Yangudi Rassa National Park	Primarily to protect the wild ass	None	Not developed, no infrastructure

But fortunately the Ethiopian government was successful in obtaining international support for the implementation of the conservation program. International supporters were e.g. IUCN (The World Conservation Union); WCS (The Wildlife Conservation Society); ODA (British Overseas Development Agency); United States Peace Corps; WWF (World Wide Fund for Nature-UK); AWF (African Wildlife Foundation); ZSL (Zoological Society of London); University of Missouri/Earthwatch; University of Oslo, Norway; UNESCO (World Heritage Commission); University of Berne, Switzerland; EU (The European Union and the University of Japan.

After the collapse of the socialist regime, the EWCO was placed under the authority of the newly created Ministry of Natural Resources Development and Environmental Protection (MoNRDEP). Thereafter, all protected-area assets and management responsibilities were transferred to the regions in which they were located. Except the Awash National Park whose responsibility retained by the EWCO because the park was divided between two regions (Jacobs and Schloeder 2001).

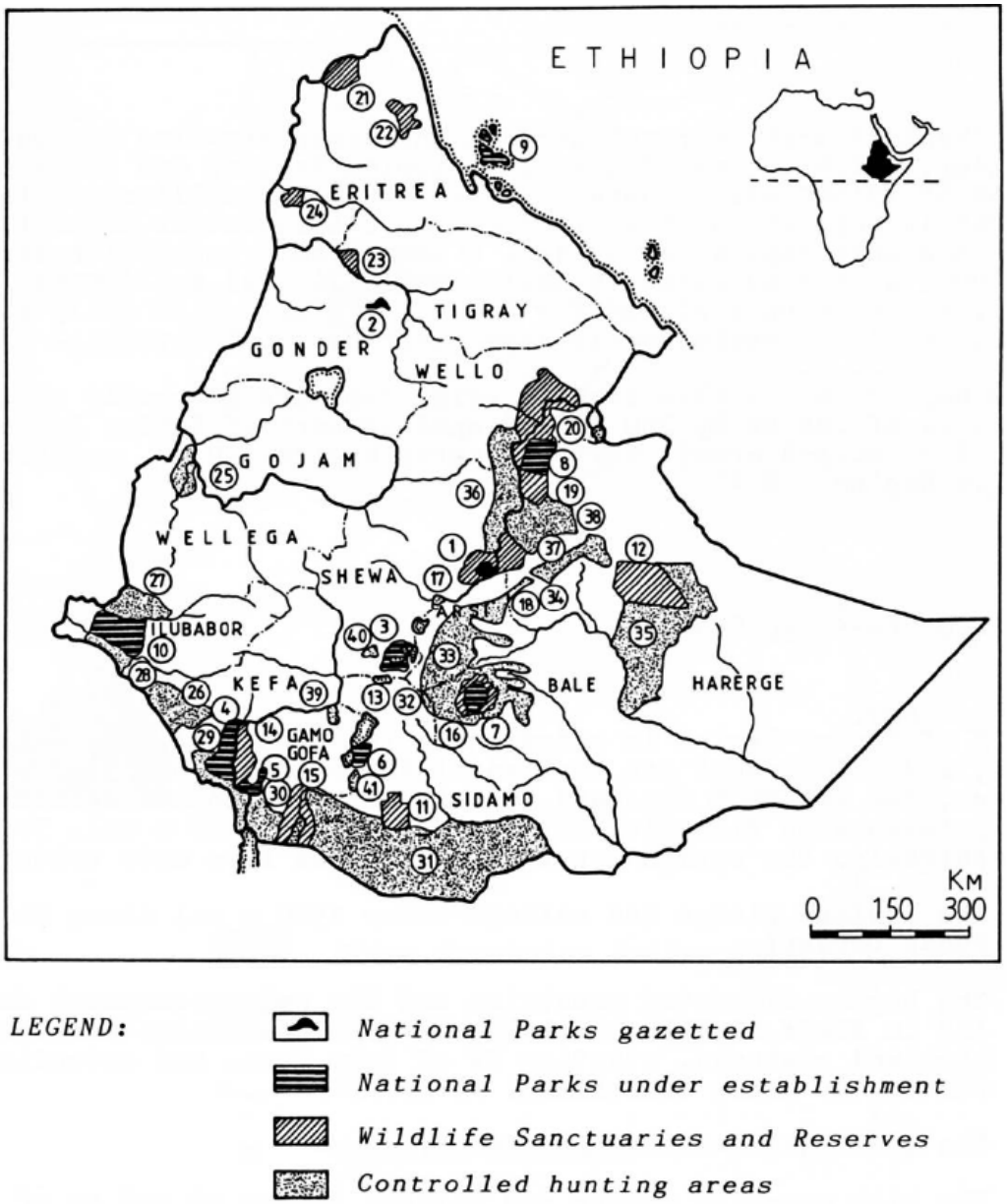


Figure 8-5: Ethiopia's and Eritrea's wildlife conservation and controlled hunting areas (Hurni 1986).

Note: the national parks that were under establishment in 1986 are all established today (exception: Yangudi Rassa National Park not developed).

Key for numbers:

National Parks

1. Awash
2. Simen mountains
3. Abiyata – Shalla lakes
4. Omo
5. Mago
6. Nechsar
7. Bale Mountains
8. Yangudi Rassa
9. Dahlak marine (Eritrea)
10. Gambela

Wildlife Sanctuaries and Reserves

11. Yabelo
12. Erer
13. Senkelle
14. Tama
15. Chewbahr
16. Bale
17. Awash West
18. Alidegi
19. Gewane
20. Mille – Sardo
21. Yob (Eritrea)
22. Nakfa (Eritrea)
23. Shire
24. Gash – Setit (Eritrea)

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9 Climate and weather of Ethiopia

Compiled by Veronika Elgart with feedback from Elias Fekade

Abstract

This paper deals with Ethiopia's climate and weather. Temperature and precipitation are taken into account. The main focus lies on rainfall as insufficient water supply limits agricultural production and, consequently, is the deciding factor for famine. The climatic conditions are discussed in terms of altitude and Ethiopia's seasonal cycle. Three environmental zones are introduced. Those are the *Dega*, the *Weina Dega* and the *Kolla*, which are a cool, a temperate and a hot zone, respectively. Rainfall activity defines three seasons. The main rainy season is known as *Kiremt*, the following dry period as *Bega* and the small rainy season as *Belg*. Regional differences in rainfall amounts and variability are discussed in respect to these seasons. Furthermore, the rain-producing factors are pointed out considering small scale as well as large scale, e.g. ENSO, phenomena. Ethiopia's rainfall variability is also dealt with on a decadonal scale. The very dry and wet years, 1984 and 1996, respectively, are considered.

9.1 Introduction

Ethiopia's climate and weather are spatially very divers. The country lies in the tropical zone of Africa and, therefore, rainfall and temperature patterns are mainly driven by the major circulation systems of low latitudes. Due to the complex topography with sides below sea level and elevations exceeding 4500 metres and the highlands functioning as a barrier, the climatic conditions range from hot and arid to cool and moist. Three environmental zones are induced by altitude. These are a cool, a temperate and hot zone; the *Dega*, the *Weina Dega* and the *Kolla*, respectively. The cool zone consists of areas above 2400 metres in elevation and is found in the central parts of the western and eastern sections of the north western plateau and in a small area around Harar. Here, temperatures varying between 16°C and near freezing are measured on daily amplitude with March, April and May being the warmest months. At night, light frost often forms. Snow occurs at the highest elevations. The temperate zone is located between 1500 and 2400 metres above sea level. That are the lower areas of Ethiopia's highlands. Daily maxima range from 16°C to 30°C. The hot zone consists of areas below 1500 metres in elevation. The annual average daytime temperature is about 27°C. Temperatures vary more widely than in the other zones, however. In summer, temperatures up to 50°C are often measured along the Red Sea coast and 40°C in the Ogaden (Osman Mahdi 2001). In Figure 9-1 (left), general temperature differences between the highlands and lowlands are illustrated. Furthermore, a decrease in the

range of daily temperature is depicted for summer months. Cooler day and warmer night temperatures result from enhanced radiation reflection of summer cloudiness.

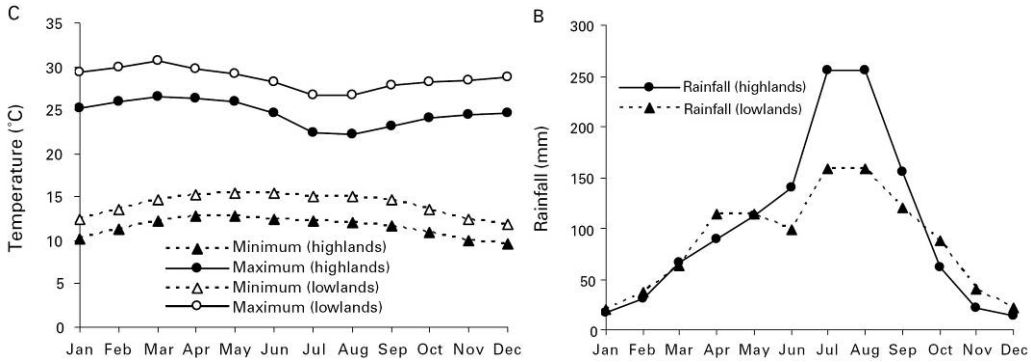

Figure 9-1: Seasonal variations in (left) temperature and (right) rainfall in 'highlands' (> 1750 m) and 'lowlands' (≤ 1750 m) in Ethiopia (Abose Tarekegn Abeku et al. 2004).

Differences in precipitation result from elevation (Figure 9-1, right), seasonal changes in pressure patterns and, hence, the origin of prevailing winds. Mean annual rainfall (Figure 9-2) accumulates to over 1000 mm in most parts of the Ethiopian highlands and is especially high in the southwest, where values over 2000 mm are measured. The lowlands contrast the moist conditions of the higher elevations with mean annual rainfall below 200 mm in the very southeast and the Danakil Depression (Lulseged Ayalew 1999). Moreover, rainfall variability is very high in dry regions. In the Rift Valley, the May – October rainfall coefficient of variation exceeds 50 percent (Segele Zewdu Tessema and Lamb 2005).

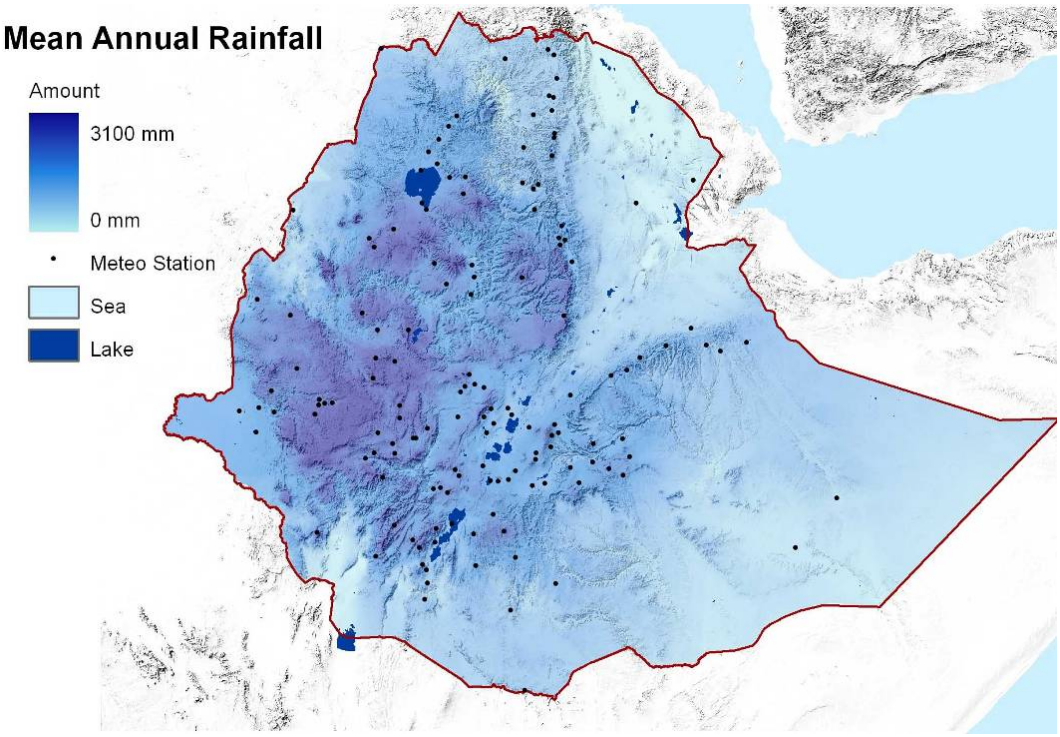

Figure 9-2: Mean annual rainfall (mm) in Ethiopia (CDE / EthioGIS 2007)

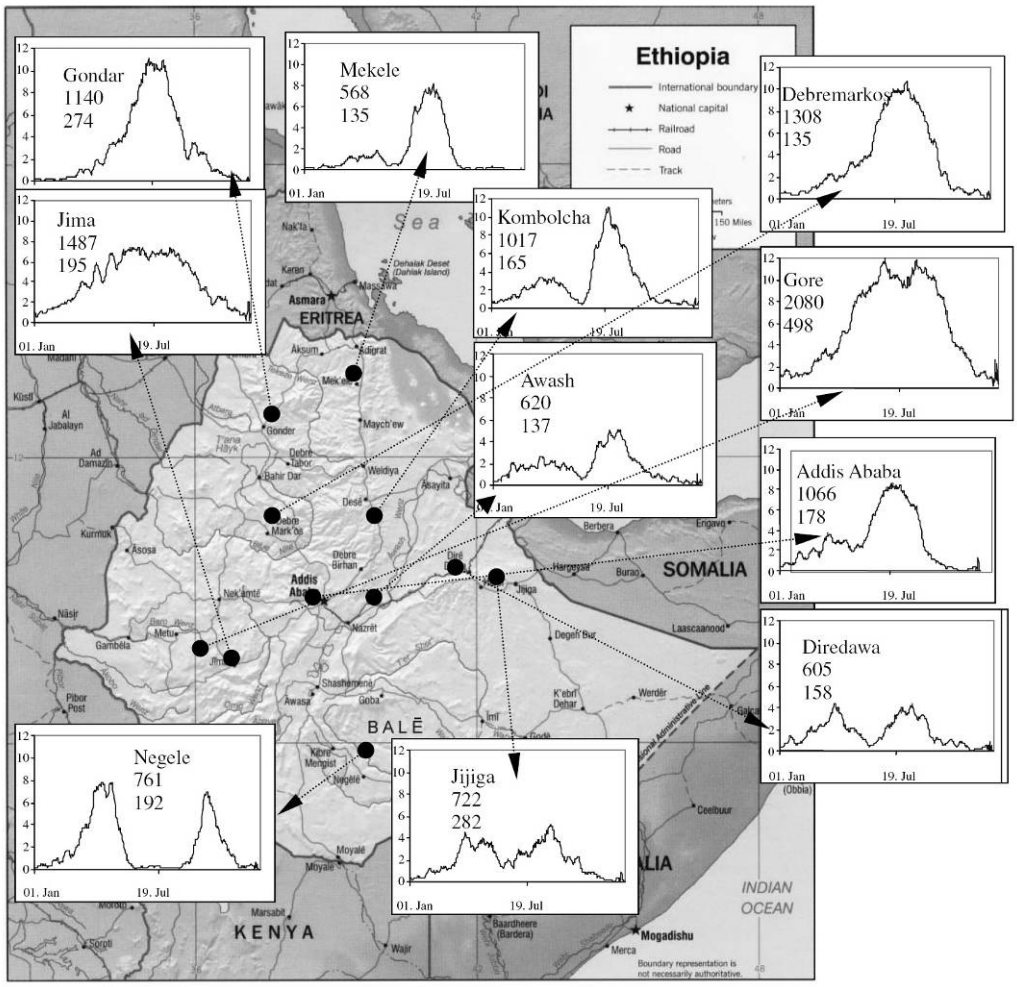

Figure 9-3: 10-day running mean rainfall (mm) of 11 stations in Ethiopia. Also the mean (top) and standard deviation (below) of the station annual rainfall (mm) estimated over the period 1965 – 2002 are shown. The first 10-day average value is plotted at 1 January (Seleshi and Zanke 2004).

Ethiopia's climate consists of three main seasons. The main rainy period goes from June to September and is known as *Kiremt*. From October to December / January, Ethiopia undergoes a dry period, the '*Bega*', which is followed by the small rainy season '*Belg*' from February/March to May. *Kiremt* rainfall covers most of the country and brings over 60 percent of the annual rainfall amounts to all of Ethiopia except for the south and southeast (Zewdu Tessema Segele and Lamb 2005). During *Bega*, most of the country is generally dry with the exception of the south and southeast receiving its second important seasonal rainfall (Figure 9-3). From February/March to May *Belg* rains are generated. In all of Ethiopia but in the south and southeast these rains are weaker than during *Kiremt*. In the latter parts, however, the main rainfall amounts are received during *Belg* (Yilma Seleshi and Zanke 2004). In the northeast, a short period of lacking rain is observed between *Belg* and *Kiremt*. In the west, this dry spell is absent.

9.2 *Kiremt* (main rainy season)

Most devastating droughts in Ethiopia occur in years of failure of *Kiremt* rainfall as 85 to 95 percent of food crops of the country are produced during the main rainy season. Dependency on *Kiremt* rainfall becomes obvious when its percentage of annual rainfall is considered (Figure 9-4a). North of the broken line, precipitation maxima fall from June to September, providing that area with 65 – 95 percent of the total annual water supply. Often, low rainfall totals are associated with a delayed onset and/or early cessation of *Kiremt*. Figure 9-5 shows long – term *Kiremt* onset and cessation patterns. *Kiremt* rains are received earliest in the southwest (early-to-mid March) and advance gradually north-eastward covering the western half of the country by mid-June and reaching the dry regions of the Rift Valley by mid-to-late July. An important feature is that the northward progress of the onset in western Ethiopia is rather slow (three month) compared with the much faster eastward advance in the eastern half (one month). In figure 5b, the temporal variability of *Kiremt* onset is shown. The variability is highest in the southwest (18 – 22 days) where *Kiremt* rains are early and smallest in the northeast (<8 – 12 days) where growing period is shortest.

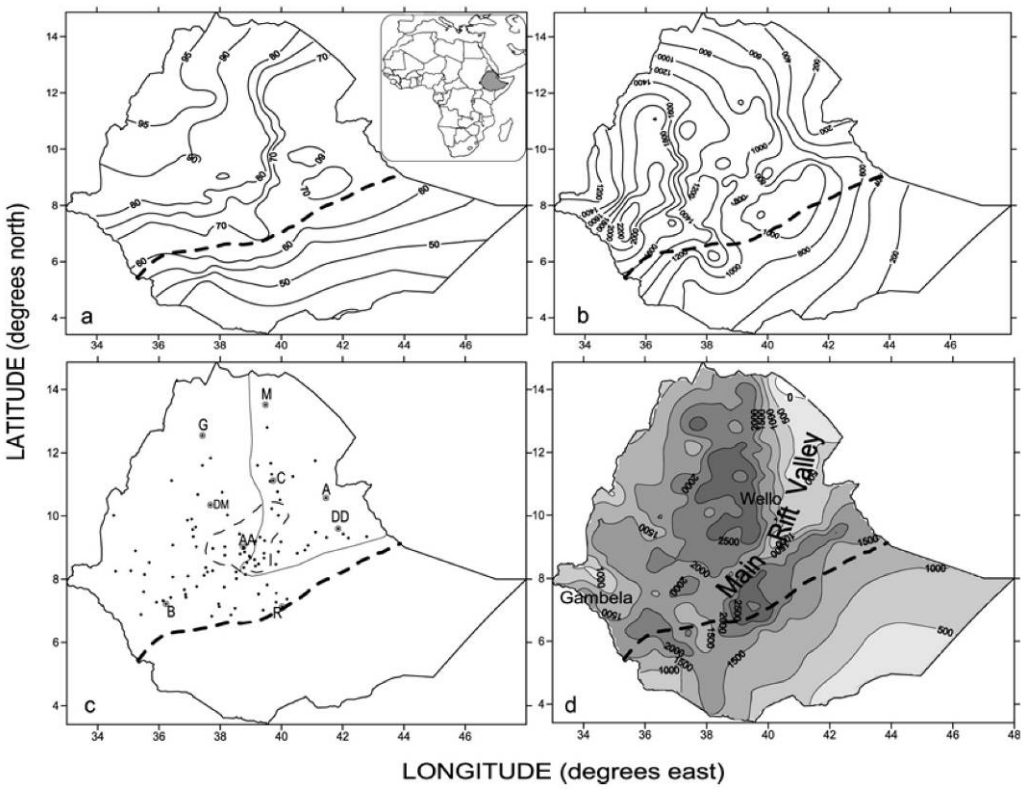

Figure 9-4: (a) Average percentage of annual rainfall occurring during May-October; north of broken line, the main (Kiremt) rainy season occurs during July-September, whereas the area further south has rainfall maxima in April and October and normally no rain in summer. (b) Long-term annual average rainfall isohyets (mm), including for area south of the Kiremt boundary in (a) based on 21 additional stations not shown in (c). (c) Locations of the 100 rainfall stations in Kiremt region used throughout this study; those circled and accompanied by letters (9) are treated further in Figure 9-6; rainfall records span 1943-99, with 98 stations having more than 20 years of records. (d) Topographical contours (Zewdu Tessema Segele and Lamb 2005).

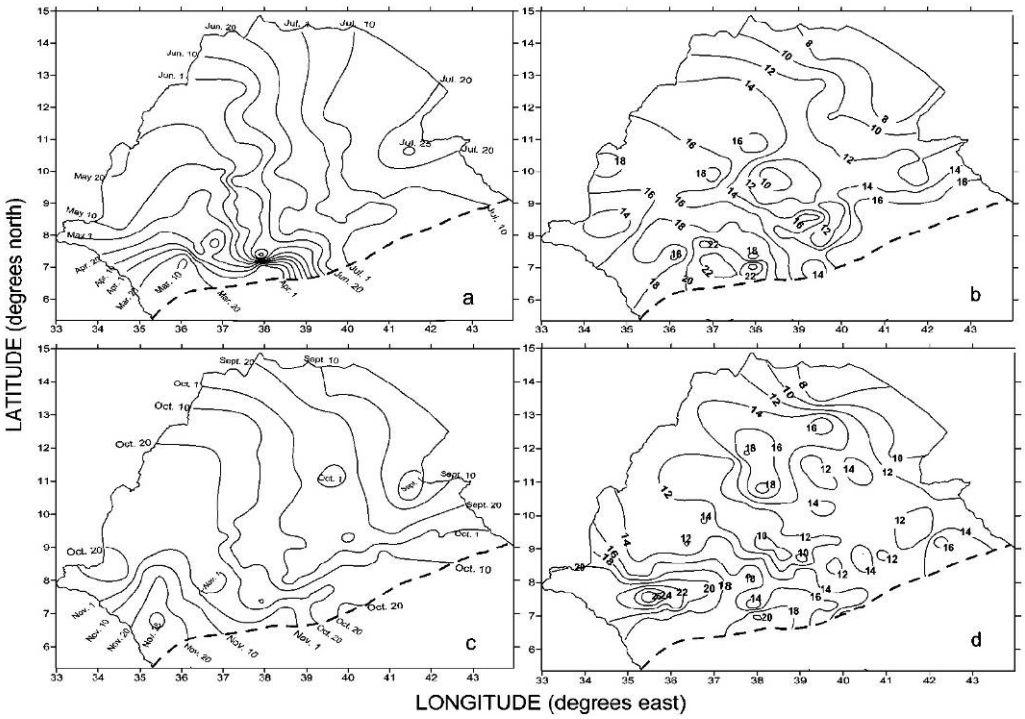

Figure 9-5: Long-term Kiremt *onset and cessation patterns. (a) Mean onset date, and (b) its standard deviation (days). (c) Mean cessation date, and (d) its standard deviation (days). Rainfall stations used are located in Figure 9-4. Broken line is* Kiremt *boundary from Figure 9-4a (Zewdu Tessema Segele and Lamb 2005).*

The retreat of *Kiremt* rains is contrary to their onset (Figure 9-5c). Rainfall ceases earliest in the northeast (mid-September), again, varying only <8 – 12 days (figure 9-5d). Last rains are received in the southwest (late November) where the end of *Kiremt* season varies up to 26 days. Besides the geographical location, variability of *Kiremt* cessation is associated with orographic effects (Wello region, see Figure 9-4d) and an inherently high rainfall variability (Rift Valley). The regional differences in the length of *Kiremt* season, as well as the intensity and duration of Belg and *Bega* are visualised in figure 9-6 (Zewdu Tessema Segele and Lamb 2005).

9.2.1 Driving Factors for Kiremt Rain

Kiremt rains are generated by various atmospheric processes. The main factors are the northward shifting of the Inter Tropical Convergence Zone (ITCZ) and major seasonal changes in circulation patterns, i.e. the Indian and African Monsoon systems, the development and persistence of the Tropical Easterly Jet and the Arabian thermal low in boreal summer. These atmospheric features are coupled to ocean circulations. Hence, *Kiremt* rainfall has been investigated to be influenced by Sea Surface Temperatures (SST) of the Atlantic and Pacific and to correlate with El Niño and La Niña events (Camberlin 1997; Dula Shanko and Camberlin 1998; Yilma Seleshi and Zanke 2004; Zewdu Tessema Segele and Lamb 2005).

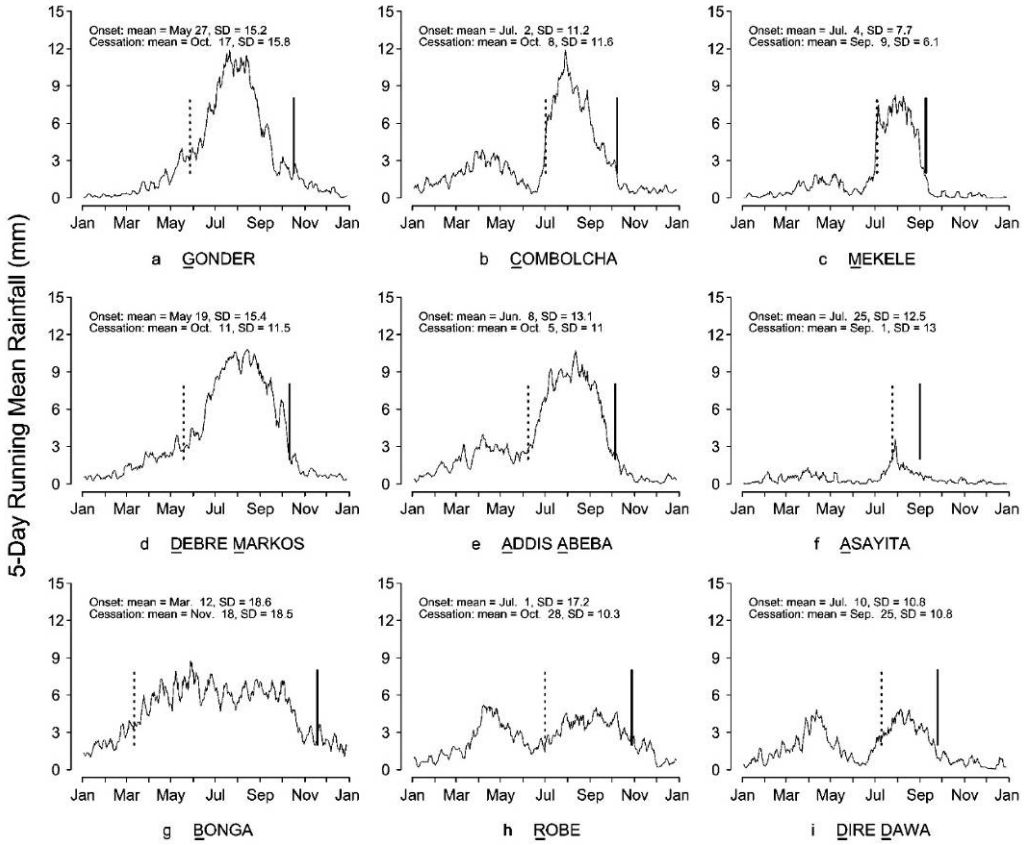

Figure 9-6: Long-term annual rainfall cycle and Kiremt *onset/cessation for representative stations arranged from northwest to southeast in approximate correspondence to their geographical location in the* Kiremt *region. Stations are located in Fig. 9-4c by circled dots and first letter(s) of their names (underlined here). Curves for each station are 5-day running means of average daily rainfall, with mean onset (broken vertical lines) and cessation (solid vertical lines) indicated. Monthly check marks indicate start of month. SD values in inset are standard deviations (days; Zewdu Tessema Segele and Lamb 2005).*

9.2.2 Northward Shifting of the ITCZ

Due to the moving zenith position of the sun, the ITCZ shifts northward in boreal summer. Thus, Ethiopia, being situated between 4 - 18°N latitude, lies within the convergence zone where an upward motion of air is dominant. The southwestward retreat of *Kiremt* rains is primarily induced by the southward displacement of the ITCZ, respectively. In October and early November, when northern, eastern and central Ethiopia is already dry, the ITCZ is still rain-producing in the south and south eastern regions (see Figure 9-3; Zewdu Tessema Segele and Lamb 2005).

The shifting of the ITCZ shows an interannual variability. This temporal inconsistency has been found to be highly reflected in the interannual variability of Ethiopia's rainfall (Yilma Seleshi and Zanke 2004).

9.2.3 Seasonal Changes in Indian and African Monsoon Systems

Major changes in the Indian and African Monsoon systems are associated with the advance and retreat of the ITCZ. From May onwards, southern hemisphere Trade winds cross the equator and reach Ethiopia as southwest winds. These southwesterlies, generated by the quasi permanent high pressure over the Southwest Indic Ocean (SWIO), hit the eastern horn of Africa, known as the Somali or East African low level jet (Figure 9-7). The jet has core speeds around 1500 metres height, i.e. near the 850 hPa level, and is estimated to contribute about 50 percent to the total global lower tropospheric mass flow across the Equator. It is the major carrier of moisture towards India (Camberlin 1997; Hastenrath 1991) and, hence, an important moisture advection factor for Ethiopia. Southwesterlies which reach the western part of Ethiopia belong to the eastern most part of the African Monsoon system. These winds are weaker than the Somali jet. Nevertheless, they are also effective in moisture advection from the Congo Basin and other water bodies like Lake Victoria. In combination with the regional topography, they result in high rainfall totals in southwestern Ethiopia, as discussed in section 2. In the south, the Turkana jet is predominant. It is an axis of strong low level southeasterlies, which divert from the Somali jet. The Turkana jet is embedded between the Ethiopian and Kenyan highland and is driven by channelling effects. In contrast to the southwesterlies, this wind is dry (Camberlin 1997).

As the rain-producing southwesterlies are part of the Indian Monsoon system, Ethiopian rainfall correlates highly negatively with Indian sea level pressure (SLP) patterns and 850-hPa geopotential heights. The strongest connection has been found over Bombay in western India, where 850-hPa heights and JAS (July-August-September) rainfall totals in the western part of East Africa correlate up to -0.8 (Figure 9-8). This indicates enhancement of Ethiopian summer rainfall for positive geopotential height and negative SLP anomalies over Bombay. This is due to a strengthening of the southwest-northeast pressure gradient between Africa and India and, as a consequence, a reinforcement of the southwesterlies above the Ethiopian highlands. Orographic lifting and enhanced moisture advection by stronger monsoon winds favour convection over East Africa. Figure 9-9 shows wind anomalies at 850-hPa during periods of pressure drop over India. Figure 9-9a illustrates the situation two days after the pressure drop over Bombay (D0); Figure 9-9b depicts the situation for the day of pressure drop (D-2). Evidently, there is a time lag between the change in SLP over Bombay and enhanced rainfall activity over the horn of Africa. No satisfactory predicting mechanism for its length has yet been found, however (Camberlin 1997).

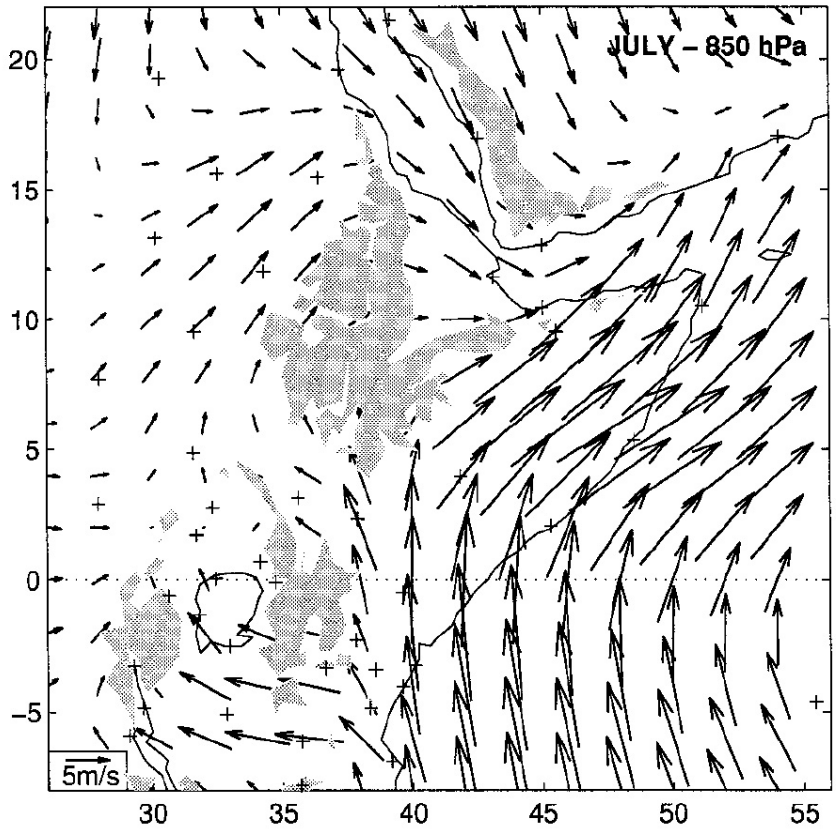

Figure 9-7: Mean 850-hPa July wind flow over eastern Africa. Based on average zonal and meridional components for radiosonde and pilot balloon stations (denoted by +). Areas above 1500 m are shaded (Camberlin 1997).

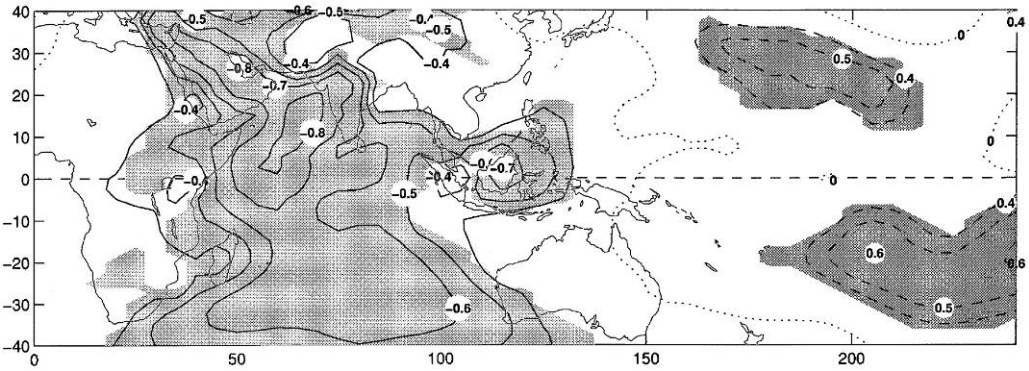

Figure 9-8: Field of correlations between JAS (July-August-September) rainfall totals in the western part of East Africa and 850-hPa geopotential heights (1963-89). Solid (dashed) lines indicate negative (positive) correlations. Shading corresponds to grid points showing locally significant correlations (95% significance level) after reduction in the number of degrees of freedom caused by time autocorrelation (Camberlin 1997).

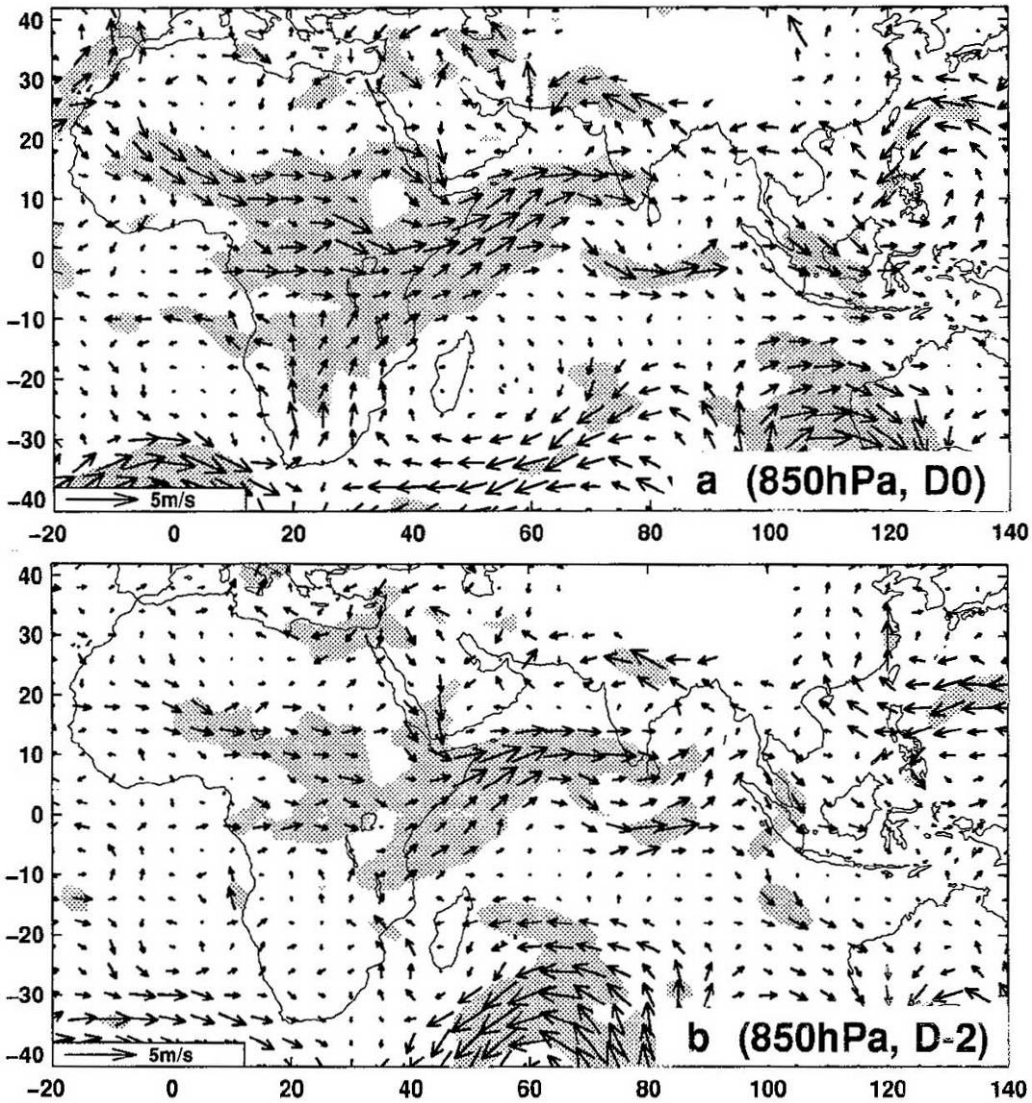

Figure 9-9: Daily JAS 850-hPa geopotential height anomalies (DAO assimilated data) for wet minus dry western Kenya rainfall composite: (a) same day, and (b) 2 days earlier. Anomalies are departures from monthly means. Units are in meters. Shading corresponds to anomalies significant at the 99% level (Student's t-test; Camberlin 1997).

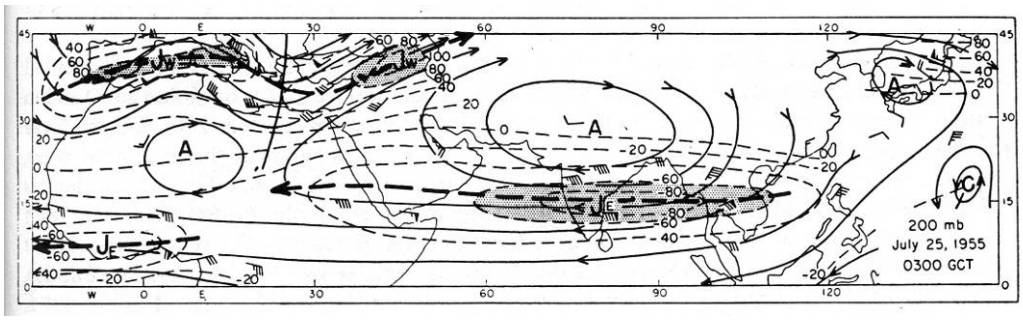

Figure 9-10: Streamlines (solid lines) and isotachs (dashed, in knots) at the 200 hPa level, 25 July 1955, 0300 GCT. JW = westerly jet maximum, JE = easterly jet maximum, A = anticyclones, C = cyclones. Heavy dashed lines with arrows indicate positions of the jet axes (Hastenrath 1991; after Koteswaram 1958).

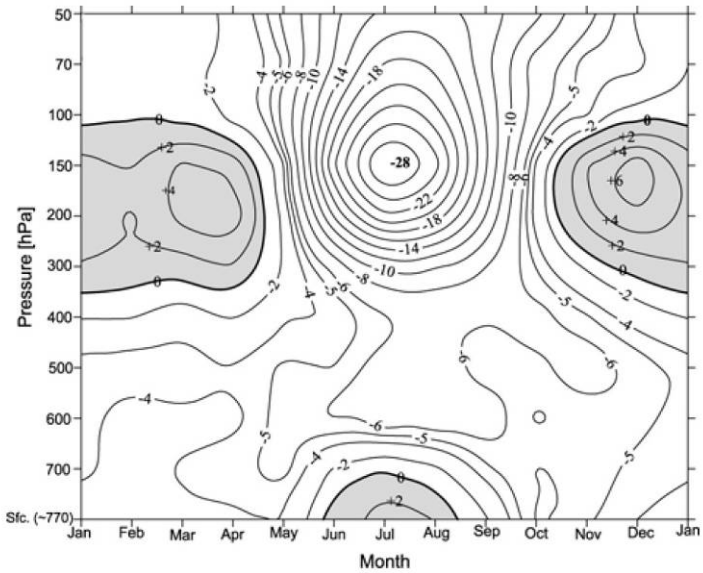

Figure 9-11: Annual cycle of vertical variation of calendar month mean zonal wind component (m s_1) above Addis Abeba. Stippling indicates westerlies (Zewdu Tessema Segele and Lamb 2005).

9.2.4 Tropical Easterly Jet

Another factor influencing Ethiopian summer rainfall is taking place in the upper troposphere: the Tropical Easterly Jet. Its development and persistence is limited to northern hemisphere summer months (late June to early September) as it is mainly depending on a strong upper troposheric Anticyclone (Figure 9-10) which, in turn, results from summer heating of the Tibetan Plateau. Over Ethiopia, the jet is situated close to 14°N and its axis lies at 200 – 100 hPa height with core speeds of about 40 m/s, which is 144km/h. When the vertical wind pattern over Addis Abeba (see Figure 9-11) is considered, low tropospheric westerlies up to a level of 700 hPa and easterlies with wind speed maxima in the upper troposphere are found. These winds belong to the Monsoon system and Tropical Easterly Jet, respectively (Hastenrath 1991; Zewdu Tessema Segele and Lamb 2005).

A strong Tropical Easterly Jet is associated with enhanced rainfall over Ethiopia. Its high wind speeds cause divergence in the upper troposphere and, thus, favour convective motion. A slow Tropical Easterly Jet, contrarily, tends to damp lifting of air. Further, an enhanced upper tropospheric flow favours the development of convective storms over the Yemen highlands and accelerates the westward movement of these systems towards Ethiopia. In Ethiopia, these storms produce additional precipitation, as discussed in the next section (Zewdu Tessema Segele and Lamb 2005).

9.2.5 Thermal Low over Arabia

During boreal summer a thermal low over the Yemen highlands establishes. Its cyclonic circulation causes the development of convective storms which drift across the Red Sea. Once these storms have reached East Africa, their intensity is augmented by stronger low level moisture inflow and enhanced lifting. The invading storms have

been found to contribute considerably to rainfall amounts. In a comparison study (Zewdu Tessema Segele and Lamb 2005) of the extremely dry summer 1984 and the very wet *Kiremt* season in 1996, the Arabian thermal low is found to be missing above the Yemen highlands in 1984. Segele and Lamb suggest a southward dislocation due to enhanced SST of the Arabian Sea. The absence of the cyclonic trigger over Arabia entailed a lack in storm generation. Thus, a reduction of rainfall in Ethiopia in 1984 has been caused.

9.2.6 Variability in Kiremt Rain

Variability in Kiremt onset, cessation and rainfall amounts have burdened Ethiopia with drought. Especially in the 1980's famine has been widespread due to unusually dry summers. Figure 9-12 illustrates *Kiremt* rain variability for the period 1961 – 1999. The years 1984 and 1977/96 shall be of special interest. The former is the driest and the latter two the most humid years since 1970. As Figure 9-12 (top) shows, *Kiremt* onset has been slightly early in the year 1984. Indeed, rain was received 5 – 20 day earlier than the long-term mean. Nevertheless, the year turned out to be the driest within the last 40 years (Figure 9-12, bottom). This was due to an exceptionally early cessation of the main rainy season, i.e. between ten up to 45 days in the western half of Ethiopia. Dry spells have been unusually long, as well. The most dry-spell-afflicted areas were the Rift Valley and the eastern and north eastern highlands. In Wello and the northern Rift Valley, rainfall deficits have been as high as 90 – 94 percent in August. In contrast, rainfall amounts were exceptionally high in 1996. *Kiremt* was earliest than average, i.e. ten to 25 days, except for the very east and a relatively small area in the southwest. Where *Kiremt* was early, its cessation was delayed as well (five to 15 days). Additionally, maximums in dry spell length were shorter than average (Zewdu Tessema Segele and Lamb 2005).

Kiremt variability has been investigated in regard to teleconnections with ENSO and SST in the central and tropical Pacific. El Niño events tend to reduce the rainfall amount of the main rainy season (*Kiremt*) while they are likely to increase the rainfall amount of the small rainy season particularly over most of the *Belg* rainy areas. Furthermore, a decrease in mean maximum temperature values over much the area is observed (NMSA, 2004). The effect is reversed during La Niña episodes. La Niña tends to increase the rainfall activity of the *Kiremt* season while it reduces the amount during the small rainy season. Consequently, summer Ethiopian rainfall has been found to correlate significantly with the ENSO cycle (dipole pattern in Figure 9-8) in the way that El Niño events, in long-term analysis, coincide with Ethiopian droughts. However, single years often do not show significant correlation. SLP over Bombay, therefore, seems to be a better indicator for Ethiopian rainfall.

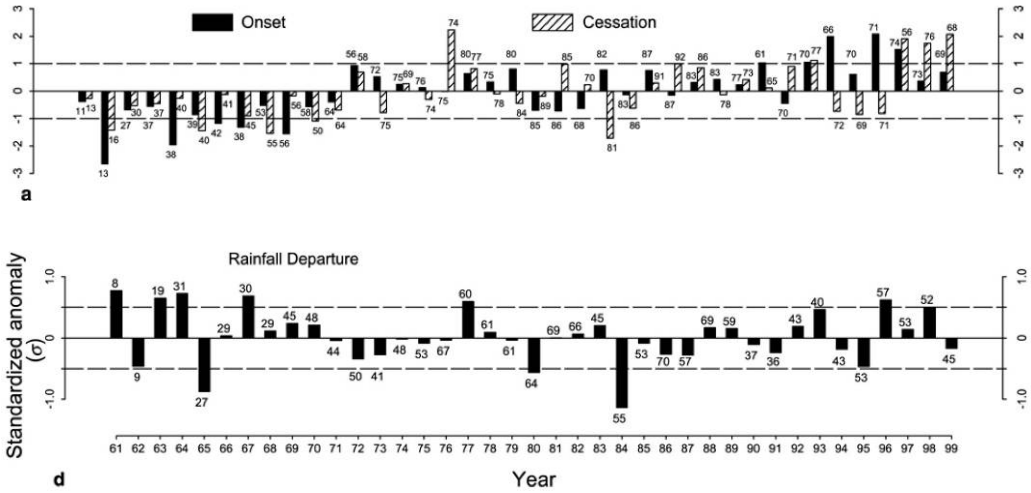

Figure 9-12: 1961-99 time series of yearly Kiremt *characteristics averaged over all available stations in entire* Kiremt *region (Figure 9-3). (top) Onset and cessation date standardised anomalies (σ), with positive anomalies indicating agriculturally favourable conditions (early onset, late cessation) and negative anomalies the opposite (late onset, early cessation). (bottom) Annual rainfall standardised anomalies (σ). Numbers for each year indicate numbers of stations used in computations, which vary slightly between* Kiremt *parameters (Zewdu Tessema Segele and Lamb 2005).*

9.3 *Bega* (main dry season)

Kiremt is followed by a dry season, the *Bega*. From October to December/January, most highlands of Ethiopia are dry, sunny and windy. Day Temperatures are warm, nights are cold (see Figure 9-1). In the southern regions of the country, however, it is the period when second important seasonal rainfall is received (Yilma Seleshi and Zanke 2004).

The dominant circulation patterns during *Bega* are the Sahara High and Siberia Anticyclone which extends as a high pressure ridge into Arabia. Due to the pressure gradient, northeasterlies are prevailing in Ethiopia (Figure 9-13). These winds are dry and seldom cause precipitation. Very occasionally, however, migratory low pressure systems, which originate in the Mediterranean area, move eastward. They interrupt the northeasterlies and generate rainfall. The south of Ethiopia is affected by different circulation features and, thus, shows a different precipitation regime in *Bega* season. During October and November, the ITCZ is still present and rain-producing. Moreover, convective systems from the Red Sea convergence zone may invade Ethiopia and drop rainfall especially in the southeast (Tsegay Wolde-Georgis 2000; Osman Mahdi 2001; Yilma Seleshi and Zanke 2004).

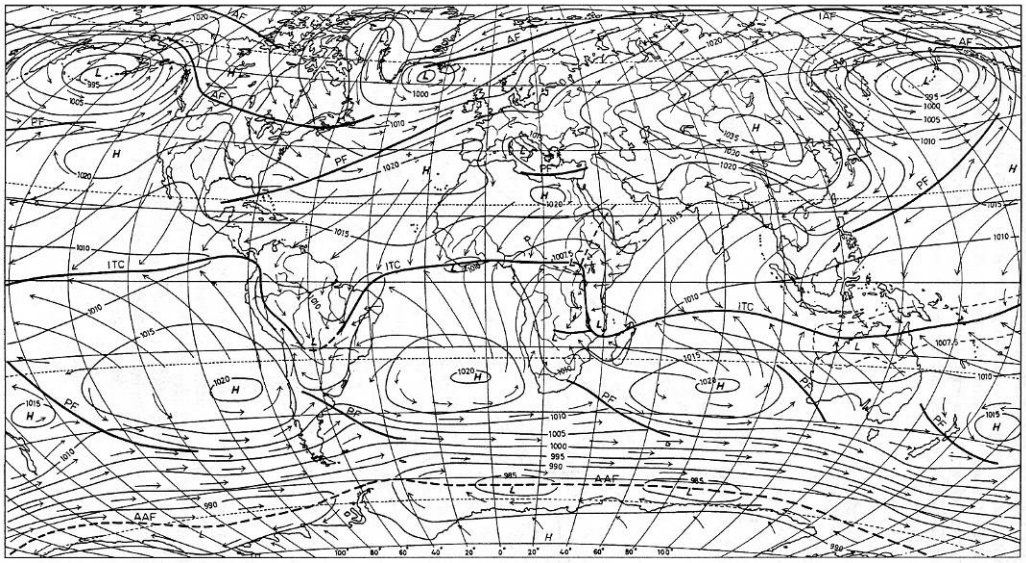

Figure 9-13: Mean global SLP pattern [hPa] in January (1931 – 1960), resulting dominant winds, fronts and convergence zones at surface level (after Lijequist, 1974). Long arrows indicate constant winds, short arrows inconstant ones (Warnecke, 1997).

9.4 *Belg* (small rainy season)

Belg is known as the small rainy season in most of Ethiopia. Total rainfall amounts received during *Belg* vary considerably between different regions. Generally speaking, rainfall totals are higher in the south. In the southern highlands, *Belg* rains are at least as intense, persistent and have an equal rain-day frequency as *Kiremt* rainfall (see Figure 9-6g, h and i; Segele and Lamb 2005). In Ethiopia's southern and southeastern lowlands, *Belg* rainfall exceeds *Kiremt* precipitation.

Belg rains are produced by circulation patterns preceding the *Kiremt* circulation system. East Africa is affected by the weakening of the Sahara and Siberia Highs, the northward shifting of the ITCZ and a increasing influence of southern hemisphere trade winds. On a more regional scale, the domination of the Arabian high (see Figure 9-13) which moves towards the north Arabian Sea and the development of a thermal low over the south of Sudan are of importance. Prevailing winds are moist easterly and south easterly. The anticyclonic circulation over Arabia pushes low-pressure air from the south Arabian Sea into mid- and southeast Ethiopia. Resulting upward air fluxes create the *Belg* rains. Additionally, *Belg* rainfall in March – May over south western, south-central and east-central Ethiopia is associated with the northward advance of the ITCZ (Tsegay Wolde-Georgis 2000; Yilma Seleshi and Zanke 2004; Zewdu Tessema Segele and Lamb 2005).

Failure of *Belg* rainfall is disastrous, as well. Between five and ten percent of crops are produced during the *Belg* season. Depending on the area, *Belg* rainfall may produce as much as 50 percent of local food (Abate 1984 in Tsegay Wolde-Georgis 2000). Missing *Belg* rains have been found to coincide with cyclone activity over the Indian

Ocean. Whenever a low pressure system occurs in the Southwest Indian Ocean (SWIO), rain activity over Ethiopia is reduced. Enhanced convergence over the SWIO provokes a marked diffluence off East Africa and a reduction of moisture influx from the central Indian Ocean. The southeasterlies, usually dominant over East Africa, are weakened or even replaced by cool and dry northerlies. As a consequence, convective activity is strongly restrained, especially over Ethiopia. This connection is not only observed on a daily scale. There is a negative correlation between cyclonic activity and monthly and seasonal rainfall, as well. A durable affect on atmospheric circulation in years of high cyclonic frequency in the SWIO region is suggested (Dula Shanko and Camberlin 1998).

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10 Paleoecology and climate change in Ethiopia

Compiled by Christine Hauert and Gianreto Stuppani with feedback from Berhan Asmamaw

Abstract

Evidences from human and mammal fossils and also through pollen or marine sequences indicate that the climate during the Pliocene and Early Pleistocene became remarkably drier. But this increase in aridity was marked by fluctuations of wetter and drier periods. Since the Early Tertiary Africa has made huge climatic changes.

During the last 20'000 years African mountains have experienced significant climatic change. Holocene was characterised through higher temperatures and more humid conditions. This led to an uplifting of altitudinal belts.

10.1 Introduction

If you search for information about the paleoecology and the climate change in Ethiopia and Eastern Africa, you will find much literature about Pliocene and the Early Pleistocene fauna and climate change and also about the change during the Late Pleistocene and the Holocene. Unfortunately there are only few studies about the period between.

Research in paleoecology and climate change in the Pliocene and Pleistocene is concentrated especially in the Turkana Basin Kenya and the Omo valley in Ethiopia. Another location for paleoecological studies is situated in the Middle Awash in Northern Ethiopia.

A lot of research in paleoecology and climate change in Ethiopia and East Africa for the Plio-Pleistocene is closely linked with the evolution of mammal faunas and early hominids.

10.2 Early Climate change in Africa and Ethiopia

10.2.1 Climate change from the Eocene to the Miocene

Extinction of large herbivores at the end of the Mesozoic 65 Ma and the warming of the earth in the early Cenozoic provided ideal conditions for the expansion of woody vegetation and forests. The Early Cenozoic of Africa remains still poorly known, but it is thought that the extinction of large terrestrial vertebrates at the end of Mesozoic facilitated the expansion of dense forests in many parts of the world. Sediments in the Turkana Basin in Kenya and Ethiopia provide limited information to this period (Bobe 2006).

Warm temperatures and high precipitation were associated with the Paleocene and Eocene. Warm ocean water supplied abundant atmospheric moisture for precipitation on the continents. After a peak of global temperatures some 50 Ma ago in the Early Eocene, temperature and precipitation were declining and open habitats were expanding (Bobe 2006: 571).

Table 10-1: Timeline of geological eras

Eocene	53-37 Ma
Oligocene	37-23 Ma
Miocene	23-5 Ma
Pliocene	5-1.6 Ma
Pleistocene	1.6 Ma- 10’000
Holocene	10’000-present

Another warming trend occurred in the Early Middle Miocene, from about 18 to 14 Ma, and was followed by a marked global cooling. Localities dating to the Early and Middle Miocene of Ethiopia, Kenya and Uganda provide paleobotanical evidence of forests and woodlands. During this period of time the South-Western part of Africa may have become increasingly arid due to the upwelling of cold waters associated with the Benguela current. This effect leads to the establishing of one of the main arid poles in Africa. Grassland was becoming a major component during this period of time and it is considered as one of the components of increasing aridity, especially in the South-west of the continent (Bobe 2006: 571-572).

During the late Miocene there was a significant increase in the diversity of African large mammals as grassland mosaics were becoming a prominent feature of the landscape. “The abundance of large herbivorous mammals almost certainly contributed to the more open nature of Late Miocene vegetation, but the animals were likely responding to predation pressures and to a high-bulk plant diet” (Bobe 2006: 574).

10.2.2 Climate change in the Pliocene and Early Pleistocene

The early Pliocene was the warmest period during the last 5 Ma years and was associated with rainforest in the Eastern Africa (Bobe 2006).

Evidence for recurrent arid-humid climate cycles and progressive step-like increases in aridity in Africa during the last 5 Ma are found through marine sediments in subtropical North-Africa (deMenocal 2004).

Fossil records of the Turkana Basin and Omo Valley

For Pliocene and Pleistocene climate change the Turkana Basin and the Omo valley represent one of the most important areas in Eastern Africa for palaeoecological research and studies. The Turkana Basin of Kenya lays directly near the border to Ethiopia. The Omo valley represents a northern extension of the Turkana Basin and flows northwards toward Ethiopia. "The Turkana Basin is one of the best studied depositional basins in East Africa due, in part, to the richness of its fossils record which spans nearly 4.5 Myr" (deMenocal 2004: 13).

And also the Omo-sequence contains one of the best-dated long sequences in the Plio-Pleistocene of Africa and provides a unique database for examining patterns and faunal evolution using changes in species abundances of different mammals. By sampling all the mammalian fossils like teeth or other fragments the research group of René Bobe was trying to conclude the palaeoecologial environments during the late Pliocene and the beginning of the Pleistocene.

The three most abundant families examined, consist of Bovidae (cloven-hoofed mammals), Cercopithecidae (Old World Monkeys) and Suidae (Family of pigs). This major families of mammals in the Omo sequences experienced significant changes in abundances through time. Due to the different abundances of the species and the different habitat they lived in, there can be drawn conclusion about the climate and environment during this period (Bobe and Behrensmeyer 2003: 405).

In the early part of the Omo sequence between 4 and 3 Ma, suids were most abundant. The family of Suidae has been difficult to interpret in terms of Pliocene and Pleistocene habitat preferences. But there are evidences that they must have lived in closed often forested environments. And also the C4 grasses were an important component of their diets during the Pliocene and Pleistocene. (Bobe and Behrensmeyer 2003)

The fossils of Hominids provide also indicators for the climate during this period of time, but compared with other fossils from mammals the hominid fossils are extremely rare and the family of hominids is typically less than one percent of assemblages.

Ardipithecus ramidus is the earliest hominid in the Pliocene and lived around 4.4 Ma. There are fossil founds in Middle Awash in Northern Ethiopia. The habitat in which those hominids have lived, consisted of well-watered wood.

Australalopithecus afarensis (Lucy) existed in the interval 3.9-2.9 Ma and also lived preferably in well-watered wooded environments. They were relatively small-brained compared to their body size (deMenocal 2004: 15).

R. Bonnefille studied a nearly continuous stratigraphy from distribution of the *Australophithecus afarensis* at Hadar. High-resolution pollen data offers opportunity to address the relationship between environment and hominid evolution. Results from the analysis of the pollen stratigraphy shows that Pliocene rainfall values (800-1200 mm/yr) were twice that of today in this region. The highest precipitation occurred between 3.37 and 3.35 Ma. During this period of time temperature was about 8-11°C lower than at present.

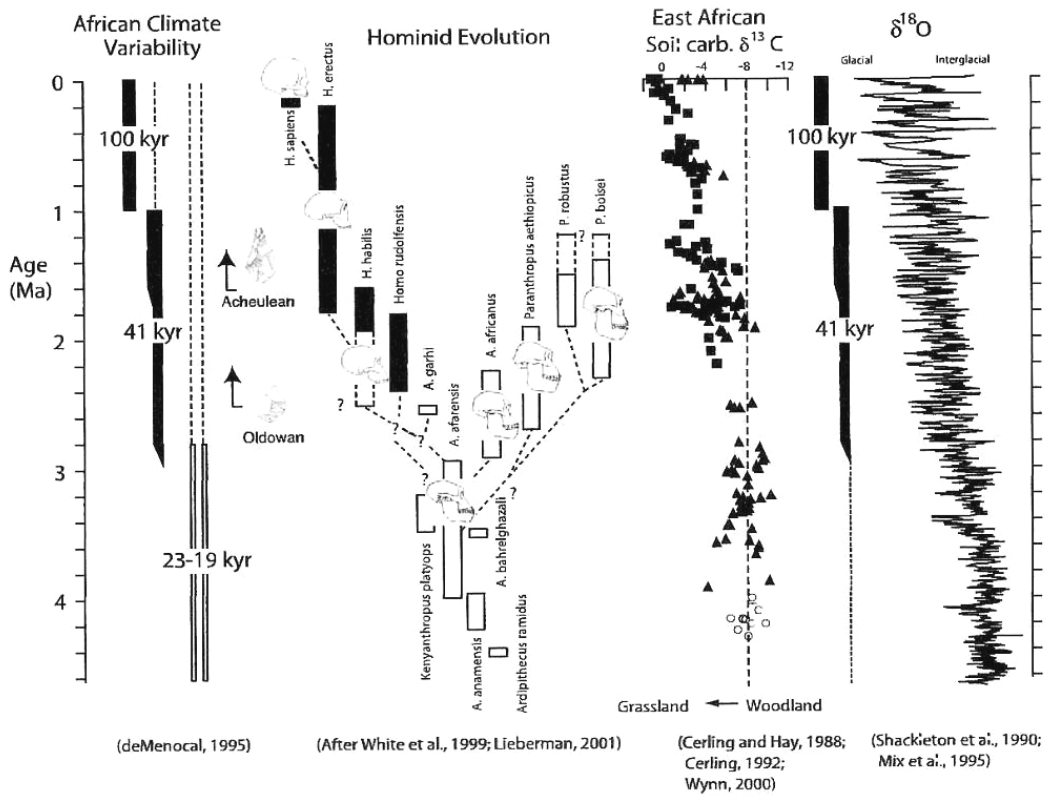


Figure 10-1: Diagram of important paleoclimatic and hominid evolution during Plio-Pleistocene. Records from the soil carbon show the change towards more grassland dominated vegetation. The figure shows very clearly the coherences between human evolution, climate change, influence of orbital cycles and vegetation change (deMenocal 2004: 17).

For the time between 3.4 to 2.95 Ma the climatic parameters reconstructed from pollen indicate cooler and wetter conditions than today. Those results are fitting also to the isotopic δ18O values from shell. The mean temperature was about 6.4°C lower than the present. The cooler and wetter conditions may be partially explained by higher elevation of this area. But the subsidence in the Hadar region was almost completed by the mid-Pliocene (Bonnefille et al. 2004: 2-4).

In Hadar the Hominid fossils were recovered through the entire stratigrapic range. That result shows that no marked preference by *Australopithecus afarensis* for a special biome existed. Cooling and biome change had no obvious effect on the presence of this species. There are assumptions that *Australopithecus afarensis* was able to accommodate to different periods of cooling and precipitation (Bonnefille et al. 2004: 4).

Climate shift around 2.8 Ma

Marine records from West and East subtropical Africa reveal some important patterns of variability during Pliocene-Pleistocene (see also Figure 10-1).

Prior to 2.8 Ma marine records show that African climate varied at periodicity of 19'000 and 23'000 years, which has been interpreted to reflect African monsoonal variability.

Owing to the marine sediments there seems to be much evidence that as soon as the high-latitude ice sheets became sufficiently larger and the glacial-interglacial period began after 2.8 Ma, the African climate covaried with climate cycles and the periodicity of 41'000 years. "The marine record of African climate variability is perhaps best described as a succession of wet-dry cycles with a long-term shift toward drier conditions" (deMenocal 2004: 8). "Prior to 2.8 Ma the marine sediment eolian records and the sapropel record tell a consistent story, namely that changes in African monsoonal climate were paced mainly by precision, as would be expected in the absence of large ice sheets" (deMenocal 2004: 11).

Apart from the visible climate change in marine sediments at 2.8 Ma there appears also a peak of faunal change by the analysis of the bovids, suids and primates abundances for this period. This peak seems to coincide in time with shifts in bovid abundances.

A stable interval between 2.7 and 2.5 Ma is following. After 2.5 Ma the pace of environmental variability is increasing. Open environments coincide with the appearance of the genus *Homo* in the Omo sequence. It seems that greater ecological variability accompanied by increasing aridity around 2.5 Ma may have been causally linked to hominin speciation.

In the Omo valley the abundances of open grassland remained lower than in the Turkana Basin until the Early Pleistocene. There are other references that before the change after 2.5 Ma the Omo valley may have provided a regional refugee. This refugee was characterised by relatively stable vegetation and climate and remained more forested than other areas in Eastern Africa. Other refuges are known from forests in Kenya and Tanzania.

In generally the trend in the Omo Valley between 4.0 and 2.0 Ma changes from more forested to more open woodland habitats. This trend is consistent with other evidence for Pliocene climate change in Africa toward cooler, drier and more seasonal conditions (Bobe and Behrensmeyer 2003).

The fossil record between 2.9 and 2.4 Ma indicates several fundamental faunal speciation and hominid behavioural changes, even though the record from this period is relatively poor. This period marks also the first appearance of stone tools (deMenocal 2004: 16).

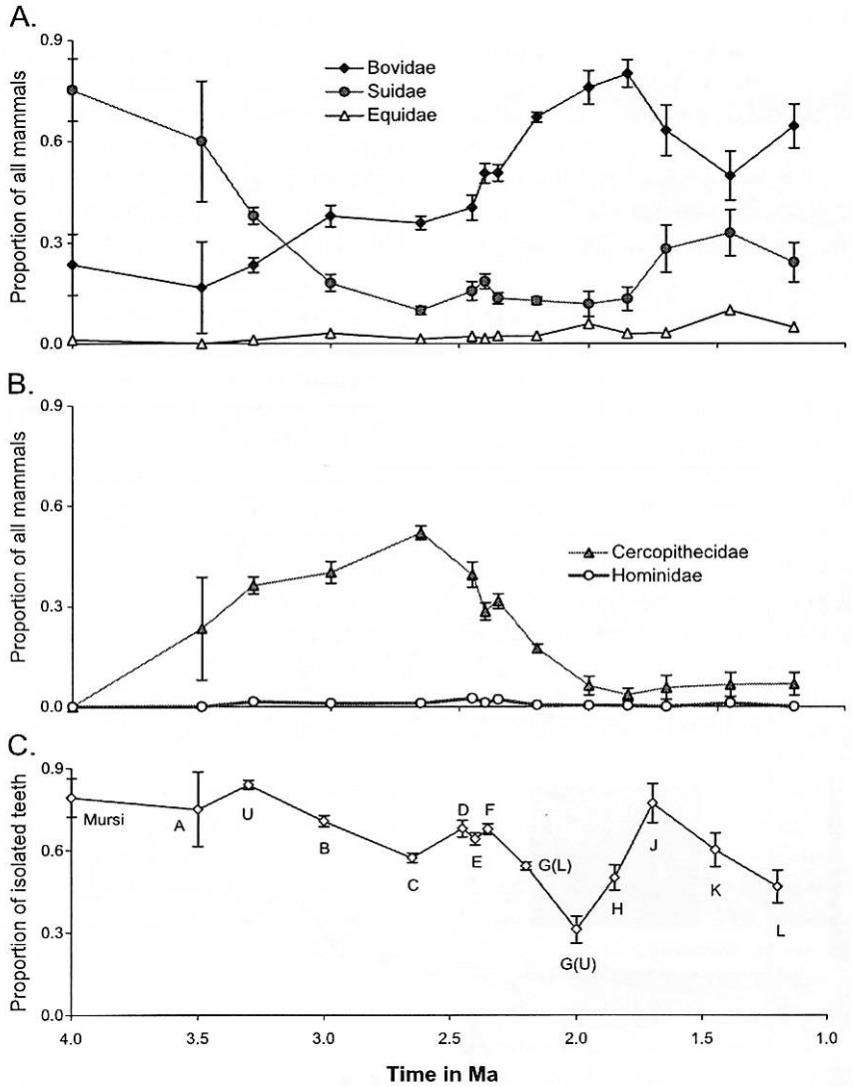


Figure 10-2: Proportion of different mammal species per interval. The graphs show significant shifts in abundances of mammal species. Hominids are rare, but their highest abundance occurs between 2.5-2.3 Ma. The suids are most abundant in the early part of sequence, and bovids in the latest part. The highest abundance of the cercopithecids occur in between the suid and bovid peaks. The figure shows a remarkable shift in abundance at 2.5 Ma and also at 1.8 Ma. (Bobe and Behrensmeyer 2003: 409)

In the interval 2.9-2.5 Ma lived at least to distinct hominid lineages, from which fossils are found in the Turkana Basin. *Paranthropus* was already more adapted to coarse vegetable matter. "The *Paranthropus* clade originated at about 2.7 Ma, following an episode of major faunal change in the Omo at 2.8 Ma" (Bobe and Behrensmeyer 2003: 416). The fossils of that period have been interpreted to reflect adaptations to more arid and varied environments. This change is also recognisable in the fossils of bovids. During this period the hominids seemed to be adapted to extremely varied habitats. Also the fossils from *Paranthropus* indicate that it lived in both, wooded and more open grassland (deMenocal 2004: 17).

Current debates about the relationship between human evolution and climate change differ especially in the point if the climate variability is the reason for human evolution or not.

One of the hypotheses about the evolution of hominids indicates that humans emerged as a consequence of the spread of savannah grasslands in Africa. Adaptation to those savannah areas led to divergence between apes and humans, because the family of the apes remained in the dense forests.

A quite different and recent idea about the effect of climate on the human evolution postulates that it was the increasing variability of Plio-Pleistocene climate and environments that caused separation pressure and new strategies for the hominid clade. This thesis would also agree with the results from Bonnefille about the adaptation of *Australalopithecus afarensis* and other recent studies. Evidences for this hypothesis is find in fossils of hominids and mammals, which are preserved in sequences of sedimentation, which indicates short-term alternations between wetter and drier climate (deMenocal 2004: 4; Bobe and Behrensmeyer 2003: 399).

The Omo sequence shows, that in the interval 2.5-2.0 Ma the bovids seemed to be the most abundant mammals. The habitat, where bovids preferably lived, was associated with woodlands or edaphic grasslands. A decline in closed woodlands and forested environments after about 3.2 Ma is indicated by taxa. After 2.5 taxa associated with secondary grasslands became more abundant than those with forests. This increase of more open vegetation and grassland is also shown in carbon isotopes from paleosols in the Turkana Basin. "Overall, the patterns of taxonomic abundances in the Omo reflect a broad ecological shift consistent with increasing seasonal aridity and reduction of forested environments, albeit with only a moderate expansion of open secondary grasslands" (Bobe and Behrensmeyer 2003: 488).

Between 1.8 and 1.6 Ma *Homo Habilis* became extinct and *Homo Erectus* first occur. There was a shift towards increase of arid-adapted species. "Enhanced East African aridity near 1.8-1.6 Ma is supported by soil carbonate stable isotopic evidence for broadly expanded savannah vegetation in East Africa" (deMenocal 2004: 18). The appearance of *Homo Erectus* is coupled with a major episode of turnover and grassland expansion after 2 Ma (Bobe and Behrensmeyer 2003: 416).

The marine records show a shift in African eolian variability after 1.0 (+/-0.2) Ma towards longer and larger amplitudes of 100'000 years. These shifts were synchronous with shifts in the onset and amplification of high-latitude ice sheets and cooling of subpolar oceans. After 2.8 Ma most eolian concentration records already display long-term trends toward greater dust concentration. During glacial extrema African conditions seemed to be cooler and drier (deMenocal 2004: 9).

In the period between 1.2 and 0.6 Ma the aridity must have been increasing again. Evidences are found in fossils of bovids and also in soil carbonate isotopic evidences. But between 1.4 and 0.8 Ma the hominid fossil record is notably poor. Marine records indicate that conditions were not just generally drier but were punctuated by increasingly longer and more severe arid episodes (deMenocal 2004: 18).

10.2.3 Summary for the early climate change in Ethiopia

There exists much evidence in mammal and human fossils and also through pollen or marine sequences that climate in Ethiopia and East Africa became remarkably drier during Plio-Pleistocene.

But climate shifts weren't continuous. Climate was marked by fluctuations of wetter and drier conditions. Some peaks of changing environment and habitats existed by 2.8 Ma. The following period seems to be influenced by orbital variation. There can three intervals divided, 2.9-2.4 Ma, 1.8-1.6 Ma and 1.2-0.8 Ma. Those intervals are also characterised by shifts in vegetation, mammal species and hominid clades (deMenocal 2004). After 1.8 Ma the climate fluctuations declined and the conditions shifted finally to more aridity.

In general the history of climate change in Africa seems to be quite complex and not yet completely understood.

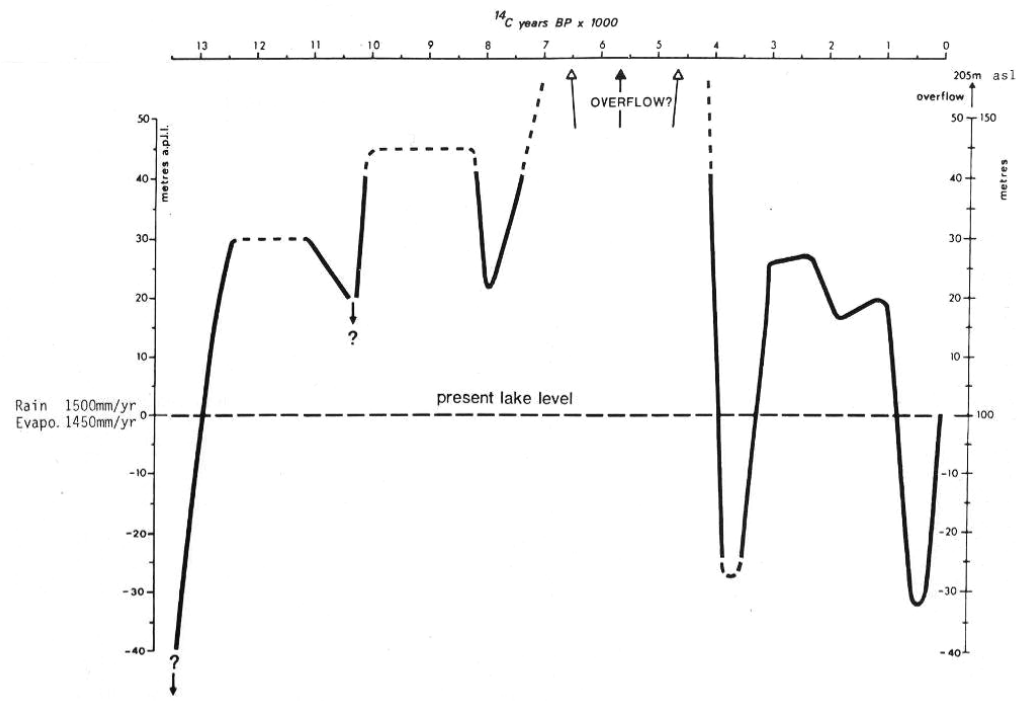
10.3 Climate change from the last Ice Age to the Present Day

10.3.1 The last cold time maximum

During the last Ice Age the climate was constant over some millennia. There was a strong depression of all altitudes. In the equatorial zone snow- and periglacial belts as well as forest- and vegetation belts declined about 1'000 metres. Precipitation was fewer than today and they had no significance for the drain (no erosion bedding). Formation activities occurred during winter because of a higher number of frosty days (Hurni 1982: 133). In addition to the decreasing precipitation the temperatures may have been lower by up to 8ºC (Frei and Messerli 1985: 34). Climatic-historical conditions in East Africa are substantially shaped by investigations of the lakes. Modest drain from the mountain area in Ethiopia influenced the declining lake levels. Consequently, the westside of the Ethiopian Mountain area remained much more dry and the blue Nile was a much more seasonal river in the late Pleistocene than it is today (Hurni 1982: 136).

In the Ethiopian Highlands we find progressive increase in the extent of glaciation from very small ice caps in the North to extensive glacier-covered plateaus in the South. In the Simen Mountains the lowest glacier may have descended to 3’760 metres, and most terminal moraines ended between 4’000 and 4’200 metres. In the Bale Mountains, valley glaciers 10 km long ended between 3’100 and 3’200 metres and the area covered by ice exceeded 600 km^2. The lower limit of periglacial activities in the Simen Mountains may have been between 3’000 and 3’500 metres, and in the Bale Mountains 3’000 metres, or even lower. It is presumed that the maximum glaciation may be connected with the reinforced humidity between 17'000 and 15'000 BP. The retreat of the glaciers at the end of the cold phase could be dated at several places in the East African Mountains at about 14’000 BP, absolutely comparable to the Würm-Weischelian of Europe (Messerli and Winiger 1992: 321, 322).

10.3.2 Climate conditions in the Holocene



Lake Bosumtwi level variations during late Pleistocene and Holocene time (Talbot et al., 1984); at left note the present-day values of rainfall and evaporation (from Talbot and Delibrias, 1977); metres a.p.l.l. = above present lake level; a.s.l. = above sea level.

Figure 10-3: This figure shows both phases as described above. Furthermore, the figure shows distinctive variations of the sea level in recent time, it is an index of big climatic changes in Africa during the last 5000 years (Maley 1991 in Frei and Messerli 1995).

Soil formations began with changed climate conditions. According to present knowledge, two phases may be distinguished: **The first phase** from 12’000 BP to 7’000 BP is characterised by a well-balanced distribution of the precipitations, with deposits of fine material and lake sediments. The soils (in the humid areas Vertisols) are characterised by Montmorillonit. **The second phase** may be dated from 7’000 BP to 4’000 BP and shows, with the accompanying deposit of sand and gravel, a seasonal

distribution of precipitation with intensive rains and run-offs. (see Figure 10-3) The resulting tropical soil formations (Ferric Luvisol) are dominated by Kaolinite (Frei and Messerli 1985: 32).

This change of climate is reflected by the paleosoils of the Tibesti in the Sahara, but also by the different sea levels of the East African lakes. A climatic interpretation could explain the first phase with persisting and regular precipitation of subtropical depressions - advances of cold air from the North - mainly between October and May. The second phase, with the summer monsoons - advances of humidity from the South - responds with heavy rainfalls (Frei and Messerli 1985: 32). By 6'000 BP the Northern Hemisphere summer monsoon was still stronger than today, although its northern limit had retreated southward due to decay in the insolation anomalies (Conway et al. 1997: 5). Compared to the accumulation of big rivers today, the rivers in the Holocene show much coarser and irregular structures. By these good conditions the soil formations increased and consequently the reafforestation started again from lowlands to highlands.

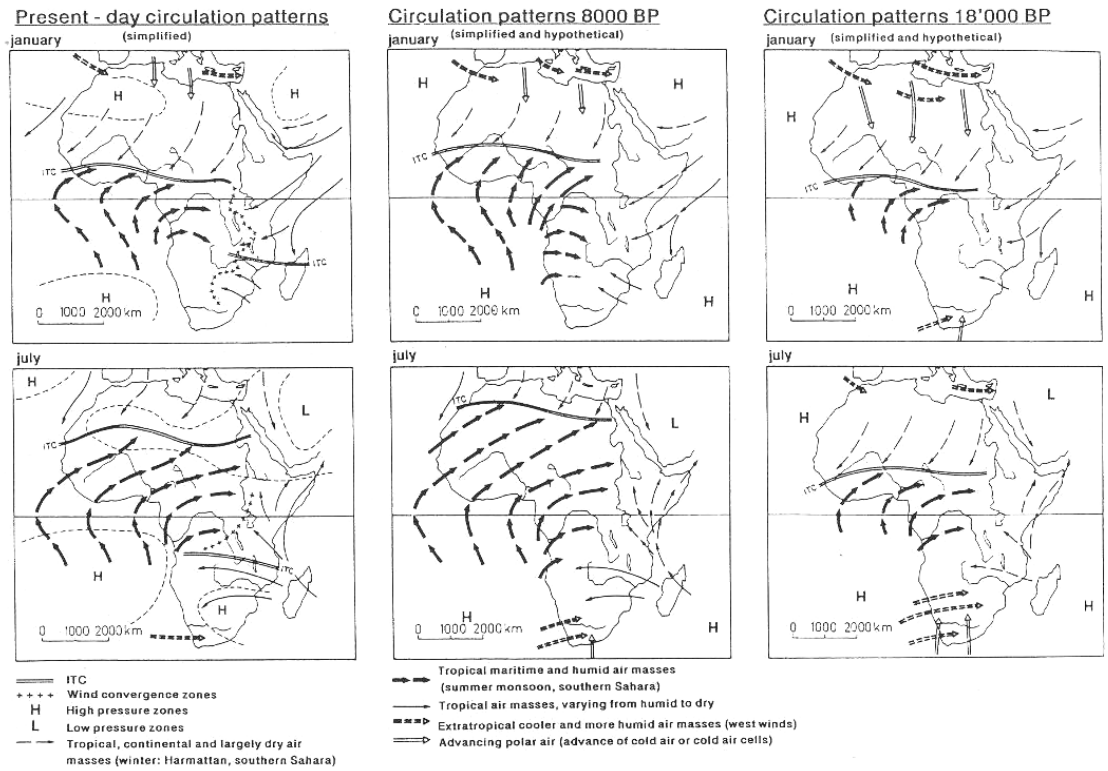


Figure 10-4: This figure is a reconstruction of atmospheric patterns, seasonally differentiated, in three time steps: today, at 8'000 BP, and at 18'000 BP. Compared with present-day conditions, we assume that at 8'000 BP , the Intertropical Convergence Zone was located further North. By 18'000 BP there was a totally different situation with a very weak monsoon flow in the summer that gave rise to district aridity during the maximum cold period (Messerli and Winiger 1992: 326, 330).

The heavy precipitation since 7'000 BP in the tropics with higher erosion were not relevant in the Ethiopian Mountains because of their higher vegetation covers (Frei and Messerli 1985: 53). Between 5'000 BP and 4'000 BP a growing aridity leads to the

destruction of soils in the desert mountains, instability of slopes and soil-covering processes in the mountains of the humid tropics. E.g. Mt. Kenya, Bale and Simen Mountains in Ethiopia show many absolute data of paleosols from this period (Frei and Messerli 1985: 33). These instability was strongest above the timber line. Researches in tropical Africa had offered that the effect of the precipitation intensity and the diameter of the raindrops had influence on soils; low intensities and diameter of drops less than 2 mm infiltrate better, while larger diameter activate soil erosion (Frei and Messerli 1985: 56). Bonnefille and Mohammed produced 1994 a 3'000-yr high resolution pollen record from the Arsi Mountains (Southern Ethiopian Highlands). Changes in species composition suggested that a cooling of 2°C occurred at 560 +/- 120 yr BP and recent regrowth of the forest was indicative of a recent warming trend. Indeed, the development of forest above 3'600 metres in Ethiopia suggested that the warmest temperatures in the last 3'000 years have occurred during the most recent decades (Conway et al. 1997: 6).

The erosive phase

The morphology of the erosion forms delivers information about temperature, precipitation and vegetation. The precipitation was much higher. The density of the erosion rills show that the erosivity was even higher than today. The erosive phase must have occurred just after the retreat of the glaciers, before vegetation fully re-established. One assumes that the erosive phase correlates with the expansion of the monsoon precipitation that took place after the last ice age around approximately 10'000 BP according to the reconstructed sea level increases (Hurni 1982: 142).

The phase of the deep soil formation

The following main process after the erosive phase was a deep soil formation of black Andosols covering periglacial horizons. They were formed predominantly through volcanic ashes. Andosole are characterised by a powerful, very porous upper layer. The bedding occurred probably during a grassland-vegetation period. The grassland covered the area of the today's mountain forests until to 2'300 m. The duration of the formation of Andosol A-horizon depends highly from the quantity and speed of the ashes-sedimentation. This activity happened probably several millennia. After a phase of climatic instability a increased surface discharge with small erosion took place in the middle Holocene before 6'000 BP in Ethiopia. This happened because mountain forests and soil formation dominated. The levels began to rise again. After the climatic optimum in 6' 500 BP - 4' 500 BP there was a continuous drying-up. Without human impact by agriculture and cattle breeding in the Ethiopian Mountains, the Andosole would be more or less constantly massive (Hurni 1982: 146).

10.3.3 Summary for the recent climate change in Ethiopia

During the last 20'000 years, the mountains of Africa between the Mediterranean and the Equator have experienced significant climatic changes with important consequences for the vegetation and resource potential. At about 18'000 BP present altitudinal belts were depressed and the zonation of climate and vegetation was

changed considerably. In the Holocene, higher temperatures led not only to more humid conditions but also to an uplifting of altitudinal belts and transformation of climatic and ecological zones and to increased natural resource potential.

The cumulative effects of natural and anthropogenic processes and impacts within the last 2'000 years are also depicted. In particular, human impact on ecosystems formed under more favourable climatic conditions could result in irreversible degradation. The mountains of the subtropics and tropics very often have more advantageous ecological conditions than the surrounding lowlands. They are an important resource potential for the future, although they may be very sensitive to climatic and anthropogenic changes (Messerli and Winiger 1992: 315).

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Part III – Sustainable development issues

11 Ecological dimension of sustainable development: degradation and land management in Ethiopia

Compiled by Eduardo Ronc

Abstract

Reports about the status of and changes in natural resources indicate that there is a problem of land degradation at a global scale. In Ethiopia the productivity of agricultural economy is being seriously eroded by unsustainable land management practices due to increasing population and livestock. Traditional farming systems, probably a good environmental adaptation in the past, have come to face their limits.

Because this country faces the challenge of reducing poverty and attaining sustainable development at the same time, it has a particular need to collaboration at a global scale. Remedial measures shall on the one hand focus on physical structures including conservation and rehabilitation. On the other hand, these ecological approaches shall not neglect the number and complexity of reasons for an effective implementation. Human limiting factors have to be recognised and included. A multi-level approach thus should lead to feasibility, profitability and acceptance of conservation measures.

11.1 Introduction

Problems of land degradation exist in many parts of the world. It is a multi-level and very complex issue as it affects numerous natural resources. According to Hurni (1997), following ones may be affected:

- soils: about one third of the world's agricultural land has been damaged, mostly by soil loss caused by water erosion;
- water: problems of quality and quantity, as well as spatial and temporal interdependence (highland-lowland effects);
- natural vegetation: problems of quality, quantity and diversity;
- wildlife: problems of protected areas, wildlife corridors, controlled hunting and poaching.

Thus, the key problems are soil degradation, the decreasing availability of water and the loss of biodiversity. The problem of land degradation that Ethiopia faces to date is first of all severe in the highlands, the most densely populated area, with high livestock appearance. This circumstance can be interpreted as a result of the ever increasing

human and livestock pressure on a decreasingly capable land resource (Desta Lakew et al. 2000: 7). Due to traditional land husbandry system, land resources and productivity potentials have already been considerably reduced in many parts of Ethiopia (Hurni 1993: 27). The subsequent move to marginal areas and deforestation leads to a rapid removal of the vegetation cover, to increased soil erosion and consequently to nutrient depletion because of soil fertility decline. With steady growth in population, for instance, clearing of woodland for agriculture has been a continuous process at an estimated rate of 620 km² ha a year in Ethiopia (Berry 2003: 3).[1] This circumstance supports the soil loss of 300 km² ha annually due to water erosion, with over 20'000 km² already severely damaged (National Review Report 2002 in Berry 2003).[2]

The process of soil erosion and its threat for the country's already insecure production has been recognised, several conservation programmes with long-term strategies should lead to a sustainable way of utilisation.

The concept of sustainable land management means a development that "meets the needs of the present without compromising the ability of future generations to meet their own needs" (Hurni 1997: 210). Therefore socio-economic factors should be integrated with physical determinants. Land degradation is a central challenge to sustainable development.

All physical evidence shows that loss of land resource productivity is an important problem in Ethiopia (see Figure 11-1) and that with continued population growth[3] the issue is likely to be even more crucial in the future.

In the following, this chapter will focus on the subject of soil degradation, leaving out other aspects such as vegetation and wildlife degradation, water and climate change[4]. Thereby not only the physical dimension of the problem but also economic, social, cultural and political limitations are specified. The imperative of these aspects should be recognised and implemented by researchers, government agents and aid workers.

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1 Forests in general have shrunk from covering 90 percent of the highlands (as estimated original extent of forest) to 5.6 percent in the year 2000 (Berry 2003: 4).

2 Soil erosion in Ethiopia: Specific test plots and experiments in 1987 and 1988 at Soil Conservation Research Project (SCRP) stations in the region show soil loss rates between 0.04 and 212 t/ha per year. About 29 percent of the total area of the region experiences high erosion rates (51–200 t/ha per year); 31 percent experiences moderate erosion rates (16–50 t/ha per year); 10 percent experiences very high erosion rates (>200 t/ha per year); and the remaining 30 percent experiences low erosion rates (<16 t/ha per year) (Desta Lakew et al. 2000: 1).

3 Ethiopias population growth rate is currently at 2.31 percent (indexmundi 2006). Even though this rate is notable lower then in 1995 with 3.00 % (Herweg 1996: 2), it faces already a population of 75 millions.

4 The latter two are discussed in chapter 7 respectively chapter 9.

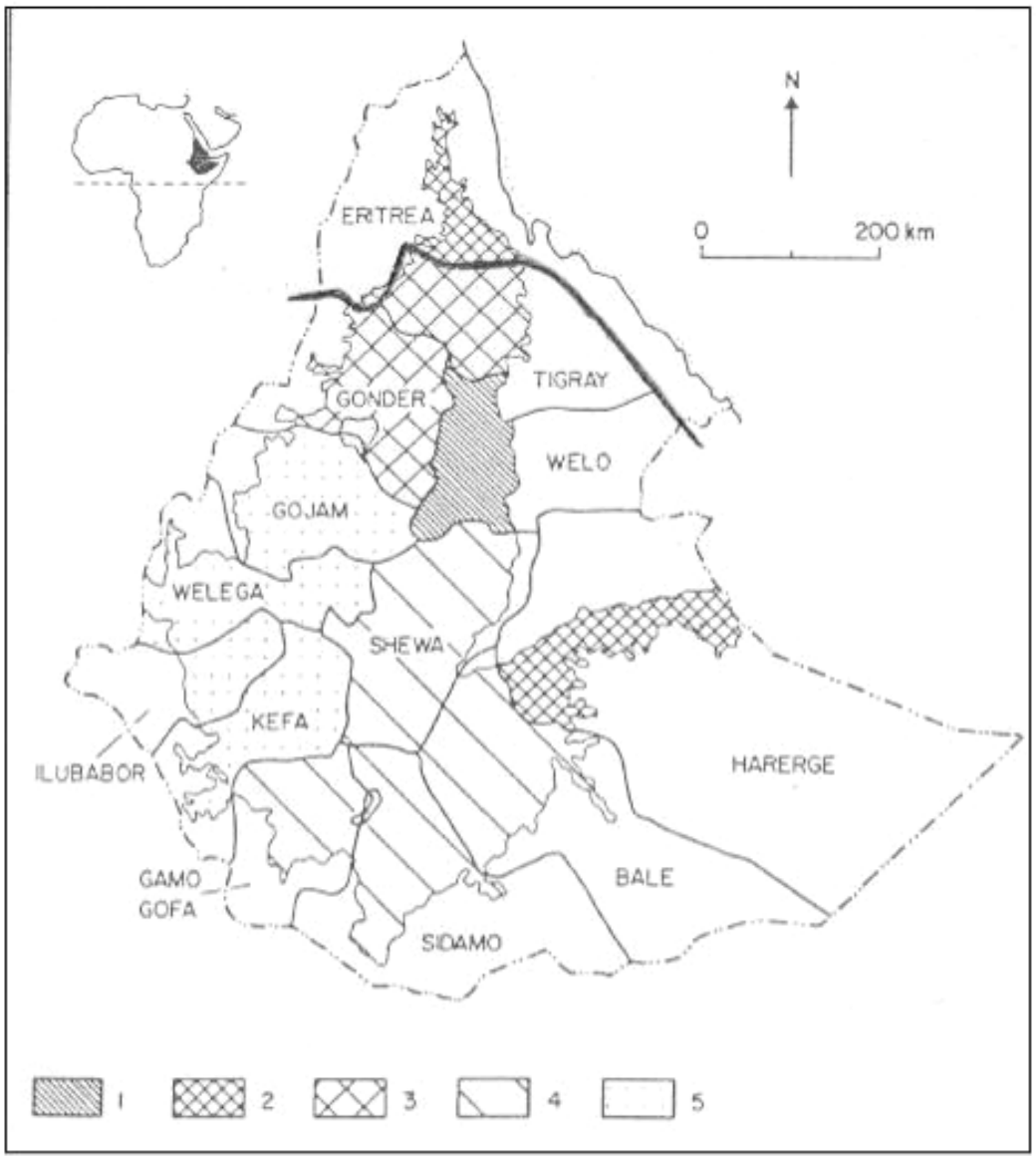

Figure 11-1: Regional extent and severity of soil degradation due to soil erosion in Ethiopia (Henricksen et al. 1983 in Hurni 1993: 36). Legend: 1. extreme (over 80% of the soils are only about 20cm deep, the rest about 100cm); 2. very serious (60-80%); 3. high (40-60%); 4. medium (20-40%); 5. slight (less than 20%).

11.2 Physical potentials and human limitations of land use

As bother in the introduction, the mechanism of land use depends on the physical and socio-economic factors which exert the basic influence on the way of cultivation.[1] On the one hand there are natural opportunities[2] given, the biotic and abiotic conditions for a certain extent of usage. Normally they are locally specific and vary regionally. On the

1 For the sake of a general view, the research approach of the Soil Conservation Research Project in Ethiopia serves as basis of this chapter.

2 Such as climate, soils, topography, water, vegetation, fauna, etc.

other hand constraints imposed by socio-cultural factors[1] derogate moreover the possibilities and therefore the freedom of decision (Herweg 1993: 27-29). Human aspects imposed are a complex network of parameters and therefore rather demanding to approach.

These two factors then are decisive and determine the definitive way of land use realised by peasants as an agricultural subsystem. If acceptance or possibilities are given, a sustainable management can be realised. By all means, naturally the resulting land use causes throughout a decrease of vegetation and soil cover leading to degradation. A certain degree of soil erosion is unavoidable. The cultivation of farm- and pastureland, for the production of plants and livestock, the use of forests as a source of energy, the utilisation of water as drinking water or for irrigation, and the appropriation for overbuilding areas has in most cases a negative impact on the environment, especially on the soil (Kassaye Goshu 1997: 27). In the long-term this resulting erosion affects the natural potential of territory and leads consequently to a loss of crop in the agricultural enterprises, and that in turn influences directly or indirectly the utilisation of land. Thus in the illustrated cycle (see Figure 11-2) it is depicted that soil erosion is a key, causing a considerable damage for the natural resources which can even trigger a collapse of the system. For this purpose conservation measures have a key function serving as a regulatory function contributing to a stabilised system (Herweg 1993: 30).

11.3 Soil conservation measures

Environmental degradation in general and soil erosion in particular will, as seen, bring only more poverty and higher vulnerability, so that the basic necessity for protection does not have to be argued upon. Traditional systems cease to properly function in heavily populated areas with lots of livestock, where both negatively impact the growth of the land (Desta Lakew et al. 2000: 4-5). On that account, potentials and limitations of soil conservation techniques should not only be related to natural but also to socio-cultural environments.

According to Herweg (1996), soil conservation basically consists of mechanical (physical) components and should have the following potentials:

- to minimise rain splash erosion
- to control runoff (water retaining and drainage of excess water)
- to minimise soil losses to a tolerable level
- to maintain or improve soil qualities (e.g. the water holding capacity and nutrient availability)
- to sustain or improve production

1 Such as economy, demographical aspects, socio-cultural values or political decisions.

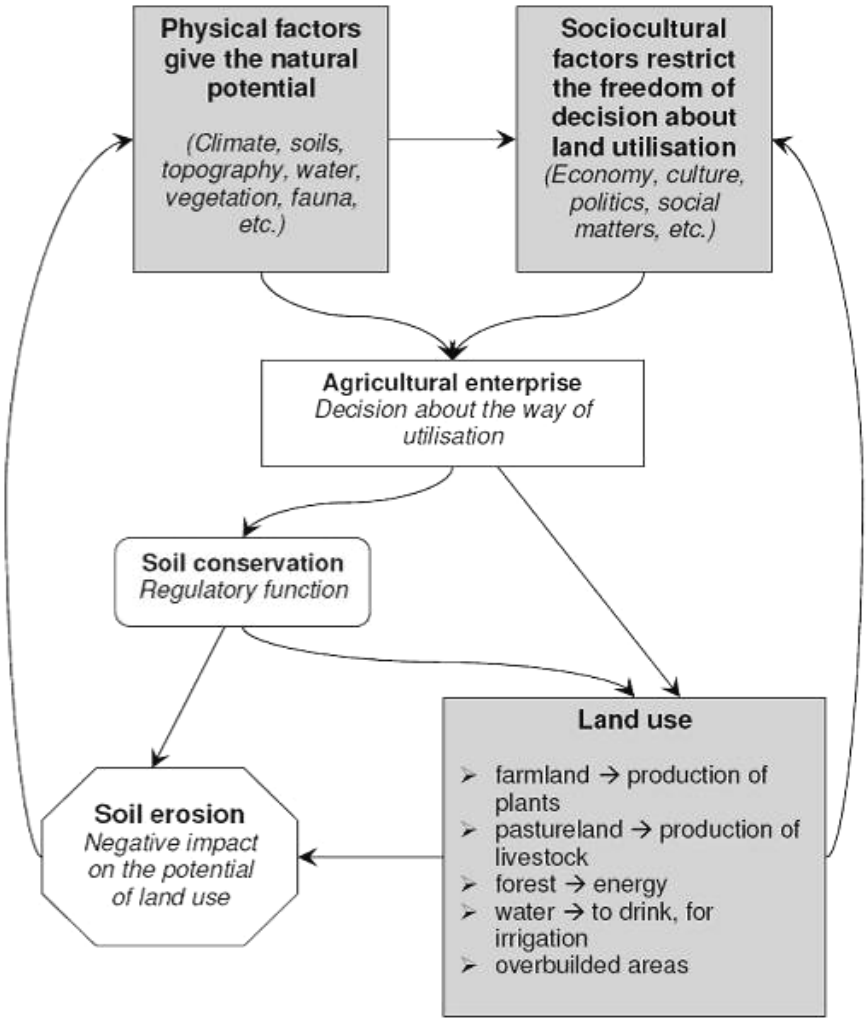

Figure 11-2: Schematically overview of the mechanism (according to Herweg 1993: 29, amended with own complements)

Figure 11-2 shows the physical, socio-cultural and land use subsystems, being the core of the research approach. It is assumed that the decision on the definite land use is made in the farm household. This decision is influenced by the natural or physical land use potential on the one hand, and socio-cultural factors like norms, values or the legislation on the other hand. Almost every kind of land utilisation is resulting in the reduction of vegetation cover, which causes accelerated soil erosion. In turn, erosion mostly negatively affects physical factors and land use potential, and thus influences future decisions on how to use the land resource. Soil Conservation is seen here as a mechanism to control meant to stabilise the system.

Actually it can be argued, that the last criteria depends on the other listed "preconditions". Good and productive soils may not yet show signs of decreasing

productivity due to erosion. The territory needs to be protected though, in order to avoid the loss of its capacity while keeping the current potential. The rehabilitation of soils is definitely more expensive and thus economically[1] unfavourable under subsistence farming (Berry 2003: 5). Table 11-1 gives a compilation of the most important physical limits appearing by implementation of soil conservation measures in Ethiopia. Natural factors such as climate, soils, geomorphology and biology lead to unregulated surface runoff and limited botanical growth, and thus cause a technical challenge. Soil degradation is the direct consequence, especially at the beginning of the rainy season, when highly intensive and erosive rains cause splash erosion overloading the infiltration capacity. Furthermore the effects of water erosion are increased by runoff coming from sealed surfaces outlying the fields (Herweg 1996: 7, 10). Technically speaking, erosion appears to be a drainage problem resulting from the removal of vegetation cover. Conservation has subsequently to deal with either excess overland flow or water shortage on one hand, and limited cover on the other hand. Runoff control is therefore one of the major issues. The problem is that soils on cultivated land are usually bare at the on-set of the rains. Agronomic protection measures, such as

- drainage systems for water holding, particularly on steep slopes with shallow soils, to determine, to control and possibly to reduce the amount of runoff,
- building of terraced land where the soil accumulates and therefore nutrients are stored, and
- improving infiltration and thus promoting plant growing conditions,

couldn't so far improve yields on a demonstrable way, but at least clearly reduce soil degradation (Herweg 1993: 41f).

There is hardly any land left under permanent cover and still untouched by humans (Berry 2003: 9). The occurrence of accelerated soil erosion implies already human interference. Physical constraints become more and more eminent however, as a result of human limitations.

1 The term „economic" includes cash as direct costs and time, labour, land, etc., as indirect costs. The term "conservation" is frequently used in a wider sense, including both conservation and rehabilitation. (Herweg 1996: 7).

Table 11-1: Extract of natural limitations (according to Mesfin Wolde-Mariam 1992: 137, in Herweg 1996: 8)

Main Limitations for Effective Soil Conservation - physical and landuse aspects			
component	**limiting factor**	**specification**	**resulting problems for conservation implementation**
climate	temperature	extremly high / low temperatures	limited vegetation growth
	evaporation	high salinity	limited choice of species
	rainfall	variability	limited vegetation growth
		high rainfall intensity	uncontrolled runoff
soils	physical properties	poor drainage	uncontrolled runoff, waterlogging
	physical properties	available water content	limited vegetation growth
	chemical properties	nutrient availability	limited vegetation growth
	chemical properties	high / low pH	limited choice of species
geomorphology	slope steepness	steep / flat slopes	uncontrolled runoff / waterlogging
	slope shape	irregular slope shapes	uncontrolled runoff
	slope length	long slopes	uncontrolled runoff
biology	competition of vegetation	water / nutrient, allelopathy, shadow	limited choice of species
	annual drops	rainfall dependent	delayed vegetation growth
	pests and diseases		limited vegetation growth
	wildlife / birds		limited vegetation growth
land use	energy requirement	afforestation	limited vegetation growth uncontrolled runoff
	overgrazing	overstocking	limited vegetation growth uncontrolled runoff
	intensive cultivation	food, fodder, fuel competition	limited vegetation growth uncontrolled runoff
	roads, tracks, settlements	sealed surface	limited vegetation growth uncontrolled runoff
	farming technology	limited know-how / implements	no more appropriate response to environmental problems

11.4 Human limitations for implementation and adoption of conservation measures

The reduction of soil loss by these measures has been considerable in comparison to the areas which remained uncontrolled. Therefore refusal of conservation implementation and adoption can be recognised as one of the prime causes. Production however, could for several reasons mostly not be sustained.

Economical pressure

One of the leading reasons for lacking acceptance is, as seen before, the *necessity* of short term economic return due to the population and livestock pressure. Soil properties should be improved and production increased to meet ever-growing demands for food and fodder. But the resulting costs of soil protection exceed the economic capacity of the Ethiopian subsistence farmers by far, meanwhile the short term economic return is still low (Herweg 1996: 1-2). Furthermore sustainable and thus long term measures aren't felt directly. Short term economic return to peasants can impossibly be achieved by conservation measures only (ibid: 14). Without direct return, only measures combating immediate threats are taken, such as guarding fields against game or

controlling surface runoff using drainage ditches.[1] Therefore the Food-For-Work programme[2] has been used to overcome the initial implementation difficulties. Once established, a sustained or even improved production should be sufficient to convince peasants to continue protecting and conserving soils by them. However, the interest in food, not in work, and the incitement of a receiver's mentality among beneficiaries were side effects which even paralyses own initiative and creativity. There is still a need of new incentives (ibid: 12f). On that account solving pressure as the origin of problem has to be solved.

Cultural incoherency

A further reason of implementation difficulties indicates the question if the measure is culturally accepted since soil conservation does not necessarily take cultural habits into consideration. The analysis of the erosion problem, the solution finding and the implementation of new techniques is clearly structured in a "northern" scientific manner that mostly ignored local knowledge (Lakew Desta et al. 2000: 12). Some more details might be valuable to grasp a little bit of farmers' perception of their environment, which is strongly related to traditional rules and institutional regulations imposed by the divinity. In some areas, for instance, they think that suffering and poverty is a punishment because of abandoned fertility rituals (Herweg 1996: 13). A further example is the impossibility of following agricultural techniques requiring a consequent treatment, on account of many religious holidays that interdict strictly labour activities whereby continuity is not given anymore (ibid: 13).

Environmental protection requires changes within a traditional society that is reluctant to innovations, guided not least by the clergy.

Political limitations

Governmental institutions, concerned to solve ecological issues, became an obstacle for environmental protection. Unfortunately, conservation measures have been introduced to peasants through discredited political institutions[3], neglecting traditional farming and without incorporating the peasants in agricultural development (Herweg 1996: 14). Conservation is destroyed not only for the side effects that stepped on implementation measures, but also for hated people who enforced them. Despite all limiting factors, the government force is the ultimate alternative, and it has been used in Ethiopia in order to protect the soil. Anything related to the government is still discredited up to the present, and often openly opposed. The national policy still lacks most preconditions for

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1 Or even if a measure happens to be acceptable, the subsistence farmers often lack the economic capacity to implement environmental protection.

2 The Food-For-Work program initially followed good intentions to combine a long term effect (by means of environmental protection) with short term return from extern support.

3 After the revolution in 1974, basic governmental institution interfered in all aspects of peasants live, not only redistributing land and collecting all sorts of financial contribution. Even the agricultural extension service, as part of the state function, took part in this development restraining and exploiting rural areas and violated traditional knowledge of farming (Herweg 1996: 13).

environmental protection, as a clear legislation on land user rights and obligations, a coordinated approach towards rural development. Starting right away from the training of extension workers, the traditional aspects are widely neglected. Inexperienced, probably too enthusiastic, extension agents contributed unintentionally for this development. Non-farmers, coming as government agents, aid workers or research technicians, are outsiders and their activities are considered alien or even evil, whereas at peasants' association level extension agents were and are responsible for the conservation measure implementation. A clear legislation and administration would be needed to define and control rights and obligations of land users in a positive sense (Lakew Desta et al. 2000: 14-16).

Under the prevailing circumstances, soil protection seems definitely to be an unfortunate product to sell. Table 11-2 could be an example for a checklist that has to be developed before conservation measures are selected, for both research and implementation.

Table 11-2: Human environmental limitations (according to Mesfin Wolde-Mariam 1992: 137, in Herweg 1996: 9)

Main Limitations for Effective Soil Conservation - sociocultural aspects

component	limiting factor	specification	resulting problems for conservation implementation
economy	cost-benefit relation	lack of short-term return	high input requirement
	farm size	small land holdings	food (land) shortage
	location of fields	fragmentation	high input requirement
	family size	large / small	food (land) / labor shortage
	age of family members	very young / very old	food (land) / labor shortage
	poverty	limited economic flexibility	high input requirement
	poverty	no draught power (increased risk)	high input requirement
	external demands	in conclict with internal demands	high input requirement
	remoteness of the area	limited accessibility	high input requirement
social matters, culture	occupational structure	high status of farming	over-utilization of resources
	environment perception	problem awareness	necessity of conservation not perceived
	traditional norms / values	religious holidays	work restrictions
	notables / respected persons	agitation / propaganda	reluctance to innovation
	risk perception	variety over specialization	reluctance to innovation
	subsistence mentality	self-sufficiency as ultimate goal	reluctance to innovation
politics	economic policy	concentration on agricultural sector, lack of alternatives	over-utilization of resources
	social policy	lack of social security (self-sufficiency mentality)	reluctance to innovation
	legislation	unclear in regard to land tenure, user rights, ownership	discouragement of initiative
	legislation	in conflict with traditions	low adaptation of measures
	administration	forced implementation / bureaucracy	low adaptation of measures
	infrastructure	availability of services / facilities	delayed spreading of innovations
	extension	lack of trained manpower	no confidence in innovations
	approach to conservation	inappropriate incentive	termination of incentive, conservation stops

11.5 Conclusion and recommendations

As seen, reasons are not easily determined within a complex set of interactions between natural and human aspects. Generally, the physical input parameter and variables build the basis for any utilisation of the land, and the population and livestock demands determine the details (Herweg 1993: 47).

Technically seen, following treated conservation measures are expected to bring down soil loss to a tolerable level: Adjusting the land use according to its capacity, increasing the vegetation cover and reducing soil loss by controlling runoff (Herweg 1996: 5).

Naturally, release from population and livestock pressure, originating the problem situation, has to be solved by the concerned institutions at higher political level (ibid.: 5). However after the very unfortunate political circumstances under the previous regime the potential for conservation in Ethiopia is generally rather low. Any interference to peasant affairs is largely discredited. Therefore a political will for environmental protection and development, and confidence building are the most urgent issues at the moment. The match with local traditions should be singled out at this. For this purpose the role of religious institutions should be looked at more carefully. Political institutions might have a certain administrative or economic power, but it is the religious institutions that really control the consciousness and the attitudes of the people (ibid.: 14). On that account the clergy might be in the near future the only alternative to positively influence peasants' minds towards environmental protection.

To date a foreign scientific ("northern") approach of recognising, investigating and solving the erosion problem[1], confronted with a common or traditional ("southern") way of life and thinking, outweighs.[2] The concept of participation itself relegates the farmer to a simple participant in decisions that severely affect his food and fodder production and consequently his life. In fact it should be the researcher or development agent to participate, if the farmer wishes so. In this field of collaboration, new experiences have to be made.

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1 Including extension agents with northern education.

2 This intercultural problem can be also seen as one of the very important failure reason of the conservation implementation (Herweg 1996: 2)

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12 Social dimension of sustainable development: ethnic and cultural tensions and reconciliation in Ethiopia

Compiled by Ivo Strahm

Abstract

The historical development of the Ethiopian State led to the formation of an ethnic and cultural heterogeneous country. This situation complicates the building of a coherent nation. There was and will be the need to keep the different ideas and values together with an appropriate and powerful instrument. After several years of domination and hegemony the 1994 implemented new constitution was based on an ethnic regional federalism. The following text will first discuss different reasons for the formation of ethnic conflicts. Then it will present the given means of conflict settlements. Furthermore some aspects of the building of ethnic identity are analysed and afterwards the regulating mechanism of the new constitution. Finally taken together all this findings the question of sustainability concerning the actual political situation in Ethiopia is tried to be answered.

12.1 Introduction and Definitions

Ethiopia is a very heterogeneous country with several major ethnic groups, roughly 80 subgroups and around 60 different languages. This diversity forms the base of the problem of ethnic and cultural tensions and may also lead to political challenges and conflicts. The close relationship of this topic to political issues and the recent political instability and insecurity in Ethiopia make this theme somehow uncomfortable and delicate. Even though many tensions are present in every day life a free and open discussion of the problem does not easily take place. Nevertheless this chapter was not skipped in this Excursion Guide and the topic was tried to be analysed in an appropriate manner. The main part of the text is based on a book written by a German author called Emminghaus (1997) and represents the view of a researcher outside of the Ethiopian cultural setting. It is complemented with other literature and the view of an Ethiopian co-author that provides the perspective and the perception of an insider.

An overview concerning ethnic and cultural tensions and reconciliation needs first a definition of the two terms ethnicity and culture. According to Emminghaus (1997: 22-23) ethnicity describes the consciousness to belong to an ethnic group that is defined by

ascriptions and demarcations made by the members of the group. Following Lang (1999: 220) culture can be understood as something that is learned by humans and is not a heritage of their genes. Additionally it refers to ways of thinking, acting and the creation of material goods of a society. Therefore, it can be concluded that ethnic and cultural tensions occur between different types of societies and are based on their different qualities.

12.2 Formation of Ethnic Conflicts

There are different concepts, which describe the formation of ethnic conflicts.

Internal Colonialism and cultural division of labour (Michael Hechter)

This theory states that an unbalanced and discontinuous **socio-economic** development may crate and intensify ethnic identity. The different development in various regions of a country leads to centres and peripheries with dissimilar accesses to power and a heterogeneous distribution of resources. These disparities and advantages enable the centres to strengthen and institutionalise their power. These processes are called internal colonialism and lead to a periphery that is economic dependent, specialised and characterised by economic problems. Finally a system of cultural division of labour is created, which may cause a refreshment of a people's ethnic identity. But conflicts arise not only because of economic disparities. They need a collective consciousness of being illegitimate discriminated (Emminghaus 1997: 24-27).

Nation-building

After the liberation from the burden of colonisation the young African states redeveloped from being a nation back to the level of tribes. As a consequence "Nation-building" was used to stop this development. The aim was to homogenise the state with a strong bureaucracy and a unique ideology. But the local government structures resisted the new introduced national parties and the newly **constructed government structures**. In fact the reaction was contrarious and this modernisation even led to a strengthening of ethnic identity. Additionally these new implemented values seemed not to be very new. They represented and served exclusively the dominant ethnic group. One culture was declared as the national culture and the other were discredited as fallen behind. Finally the state always remains very vulnerable concerning ethnic claims because it can never satisfy all ethnic demands. He is also harmed by concessions made (e.g. demands for ethnic autonomy) and the resulting enforcement of the ethnic groups and their leaders (Emminghaus 1997: 27-29).

The contradictory function of democratisation

Democratisation may overcome false ethnic identification if the society of a state is able to produce a social consensus. But it will fail or even increase ethnic identification in countries where no social consensus is possible. In case of abusing **democracy to justify its own political control** without fulfilling the system's demands

democratisation will end up in a political disappointment and the wrongly created hope may strengthen ethnicity. For example several African "democratic" systems in fact work like a conventional dictatorship. Additionally the European-born democracy was applied to the African countries without adaptation to the respective national contexts and different political realities (Emminghaus 1997: 30-32).

These three social processes described above may result in ethnic conflicts. But they do not explain the formation of a conflict alone. It is also very important to consider the development process from the upcoming ethnic identity of a people in the beginning, the resulting use of ethnicity for political purposes afterwards and finally the erupting ethnic conflict. In this case ethnicity is used as a mean of political action. It is based on different factors influencing political parties. For example, the weakness of established political parties and the attraction of ethnic parties because of socio-economic fights concerning goods in a broader sense (Emminghaus 1997: 32).

To summarise, it can be stated that the formation of ethnic conflicts need some typical **basic requirements** (e.g. economic disparities, abuse of a political system) and a **process** (e.g. abuse of ethnicity for political purposes).

12.3 Regulating Ethnic Tensions

According to Emminghaus (1997: 39-54) there are several concepts to regulate ethnic tensions. On the one hand, there are **destructive approaches**; on the other, it is possible to proceed in mainly constructive ways. The most barbarous idea is the homogenisation of a nation by genocide as for example the killing of the Tutsi in Rwanda. Another destructive process is secession and fission. The success of this means of action is judged controversial. Ethnic conflicts frequently become very bloody and national uniformity is only maintained by violence. If this happens an alternative organisation of the state must be considered and tested. But the "social costs" such as forced migration and killings of people however are often very high and the fission of a state will eventually lead to more complication and would not be justifiable. Then it is also possible to homogenise a state by unintended assimilation or resettlements. Two different processes of assimilation can be distinguished. The voluntary assimilation emerges as a result of the attraction of the ruling class. The unintended arises of hidden or apparent pressure. It leads to disadvantages for the affected persons in case of the denial of the assimilation process. This process is most successful if the dominant group has a numeral overweight and their culture is very prestige. The other possibility is the forced resettlement, which will also help to homogenise a population structure. In Ethiopia during the famine in the years of 1984 and 1985 ethnic groups were consciously resettled because of warlike strategies. The goal was to deprive the enemy of the support it received from the rural population. These actions led to a destruction of long time grown ethnic and cultural structures. Finally the process of dominance and discrimination is a destructive concept of settling ethnic conflicts. Here the homogenisation of a society is secondary and there is also no

effort of integrating ethnic minorities; whereas discrimination of them becomes very important (Abbink 2000). One example is the South-African apartheid regime.

Constructive concepts are based on the acceptance of the ethnic pluralism and do not force the homogenisation of a society. One possibility is the right of autonomy and self-administration. With this approach conflicts are tempered by alienating regional limited authority. This autonomy can also be reduced to only one or a few social, political, economic etc. aspects of the society concerned. The cultural autonomy, for example, covers exclusively the right of individual cultural expression and realisation. These competences may range from the personal to the institutional level. But this strategy however may cause high costs in the public sector. For example if the governmental administration and the educational sector are maintained multilingual. These expenses may exceed the governmental budget and can not be implemented by every state. The idea of the consociational democracy incorporates the two principles of rotation (changes of important political position in a rotation principle) and "power-sharing" (important political positions are shared by the different social groups). But it only works under the following three conditions:

- There must be a consensus that no homogenised national identity is aspired.
- There must be the conviction that conflicts can be solved by consensus.
- The political representatives highly need to be supported by their ethnic band.

The last and maybe the most ambitious concept is the idea of federalism that is defined by the fusion of autonomous entities to a superior whole. The main criteria are the organisation and division in bands (Emminghaus 1997: 55).

In the case of Ethiopia some of the methods explained above were used by different regimes in the history of the country. Haile Selasse followed a policy of assimilation, during the *Derg*[1] Regime forced population transfers were executed and the recent government allowed self determination and even secession (see below) (Asnake Kefale 2002: 2).

12.4 Ethnic Identity in the Ethiopian State

Following Braukämper (1991) the ethnic population of the Horn of Africa may be divided in seven main groups: the multi-ethic society of Eritrea, the Tigray, the Afar, the Amhara, the People of South-East Ethiopia, the Oromo and the Somali. The last seven ethnic groups are all represented in the Ethiopian State and often cut territorial and even national boundaries. Furthermore this basic heterogeneity needs to deal with potential conflict situations such as disparities between highland and lowland, settled and unsettled ways of living, Christians and Muslims, colonial boundaries and a variety of languages. As a result movements for autonomy and also separation occur. But why is it so hard for the Ethiopian State to balance the needs of these different ethnicities?

1 Derg: Communistic regime in Ethiopia from 1974 up to 1989.

Looking for an answer we may come back to the concept of Internal Colonialism (M. Hechter) as presented above. It is possible to apply this theory to the Ethiopian State during the time of Minilik II. At that time the birth of the modern Ethiopia was fulfilled by the conquest of new territory in the south, east and west. This occupation builds the background of the existing recent ethnic conflicts. The integration of new peoples such as the Oromos, Gurage and Afar led to a new social structure. The former dominant regnant group (the Abessinian people) with its exclusive Christian religion and the homogenous cultural tradition lost its leader position and was now part of a heterogeneous state. The following executed hegemonic governance policy of the Minilik regime then caused economic and political unbalanced structures, which have remained a problem until today. One mode of discriminating and controlling the new regions was the establishment of *Naftanyas*[1]. This was a kind of tenancy between solders of the army of Minilik, Amharic settlers and sometimes other people faithful to the emperor, whereas the local habitants could control only a small part of their former holdings. Additionally the *Naftanyas* received the right to asking the locals to do compulsory labour and to pay taxes and tolls. They were also responsible to do jurisprudence and to collect governmental taxes. This led to a nearly enslavement of the local population and therefore a kind of baronial social structure. Following the theory of Internal Colonialism this system could be called, in this case, a Hierarchical Division of Labour. After the revolution and the land reform in 1974 the system of the *Naftanyas* was terminated. But the existing disparities have remained. Beside this asymmetric development the dominant position of the new capital Addis Abeba led to the development of backward and peripheral regions (e.g. the Tigray region) (Emminghaus 1997: 65-69).

Even though the Amharic people claimed to be the ruling class the Amharic Culture did not serve as a mean of identification. One reason for this is the materialistic poorness of the Abessinians compared with the conquered lands. The latter appeared to be more fertile and owned a higher potential of natural resources. Further the authoritarian way of governing, as described above, led to hostile attitudes towards the state and is one of the main reasons for the different civil wars. Finally the fulfilled language and religion politics, which explain the exclusive self-understanding of the Amharic People, emphasise the high centralistic action of governing. After the occupation the Orthodox Christianity was proclaimed as the basic of the whole new Ethiopian State and was written down in 1955 in the convention as the state religion. More or less the same happened in the case of the needed official language. The Amharic language became the exclusively admitted way of communication and was taught in all schools nationwide. This approach of "nation-building" however led to more ethnic identification within the different ethnic societies and failed as a means of integration. Up to the year of 1991 there are two constant aspects describing the Ethiopian politics. On the one hand the political and economic dominance of the Amharic people was very strong; on the other there was a distinctive centralism in Ethiopia (Emminghaus 1997: 69-72).

1 Naftanyas: A kind of tenancy.

This situation was the origin of the different liberation movements such as the one of the Oromo People (OLF: Oromo Liberation Front) or the one of the north-eastern Tigray Area the TPLF (Tigray People's Liberation Front), which developed from the point of their formation in the year of 1975 as a liberation movement to a government party in 1991 (Emminghaus 1997: 75-76).

Recently there are two concepts of identity dominant in Ethiopia. According to Tesfaye (2002: 95-96) there is on the one hand the concept of the ethnic view. It suggests that the main contradiction in the society is not class, but ethnicity and that peace and stability are only assured by guaranteed ethnic group rights. No ethnic group should ever again dominate Ethiopian politics. On the other, there is the idea of a Pan-Ethiopian identity that assumes that the recognition of ethnic group rights will lead to the "Balkanisation" of Ethiopia. These arguments remain as two fundamental positions in the discussion about the usefulness and appropriateness of the ethnic federalism in Ethiopia.

12.5 Democratisation and the ethnic regional federalism in Ethiopia

After a period of socialism from 1974 to 1991 the Ethiopian people politically accepted in 1994 the new constitution and voted in 1995 for the first time a democratically legitimated cabinet. The new constitution contained several elements, which are intended to settle ethnic conflicts. For example there was a reorganisation of the different regions of the Ethiopian State according to ethnic and linguistic boundaries. Additionally the ethnic regional federalism was emphatically introduced in the constitution. It allows all different ethnic groups the right of self-determination and even the chance of secession. These two elements represent the willingness of implementing decentralisation processes and the readiness for the distribution of competence and autonomy within the new created regions (Emminghaus 1997: 79-87; Kidane Mengisteab 1997; Vaughan 2003).

Thinking about these implemented elements of decentralisation it is important to answer the question whether they are able to reduce the potential of ethnic conflicts. Emminghaus (1997: 94-104) discussed three different aspects:

- With a structural analysis the ethnic regional character[1] of the new constitution can be confirmed. I.e. the constitution fulfils the demands of the ethnic regional federalism. But there is a problem of lacking authority concerning financial aspects. Therefore the system suffers from a typical "**structural deficit**" as known from proceeding decentralisation processes in other countries.
- As a long time centralistic governed country the implementation of federal structures depicted an important cut and a novelty in the political system of

1 Emminghaus (1997: 94): There is a federal principle and an ethnic linguistic approach used to define the new boarders of the different regions.

Ethiopia. Even thought, from a historical point of view, the reorganisation was necessary, the changes were a subject of strong discussions within the country and abroad. But the **federal idea** of the constitution may fulfil its requirements of preventing the country from declining in ethnic conflicts. A federal principle may meet the historical background and is useful for picking up actual problems.

- Even thought the ethnic autonomy of the different groups is written down in the constitution there are always minorities with no autonomy. Additionally the need of an official and countrywide applicable language, which is Amharic, lifted the Amharic society again hierarchically above the other ethnic groups. Beside these practical aspects the question remains whether the positive aspects of autonomy exceed the **risk of disintegration** resulting from the admitted autonomy. The analysis of the new introduced constitution lead to the conclusion that there is a high potential of disintegration concerning ethnic autonomy within the heterogeneous Ethiopia.

"The overdue need of terminating the Amharic domination and the expected positive aspects of decentralisation can not balance the risk of an additional political ethnic identity. Rather an appropriate participation of ethnic groups should be implemented, without the transfusion of ethnic identity on political institutions because the constitution does not comply with this aspect" (Emminghaus 1997: 102 (own translation from German)).

These aspects above consider the formal and structural elements of the Ethiopian political system but do not cover the concrete realisation of the intended changes. The implementation of the new constitution was followed by different lacks of legitimation. First there were high inconsistencies in the procedure of voting within the whole country. Several irregularities led to the conclusion that the voting was not everywhere liberal, fair and secret. Then the voters often did not know for whom they voted and what the elections aimed at. Furthermore the educated people with their knowledge about politics did not follow the elections and the voter participation was only around 40 percent. Third the voter suffered from a high pressure through the local administrative infrastructure (kebele/peasant association) and participated only to avoid repercussions. Finally the elections did not evolve as a competition between different parties, as it should be in a democratic system, because the parties of the opposition did no participate and boycotted the procedure. The EPRDF (Ethiopian People's Revolutionary Democratic Front) won with roughly 85 percent of the votes. Because of these lacks of legitimation the constitution and its ethnic federal aspects had an ambivalent beginning and its usefulness as a means to settle conflicts remains questionable (Emminghaus 1997: 105-112).

In a heterogeneous country such as Ethiopia the influence of the language policy is very strong. For years the Amharic language was the dominant, or made dominant, and exclusively way of communication. In the new constitution however the multilingual characteristic was explicit introduced and was described as follows:

- All Ethiopian languages shall enjoy equal state recognition.
- Amharic shall be the working language of the Federal Democratic Republic of Ethiopia.
- Each member of the Federation shall determine its own working language.

But what is the potential of the new language policy in the case of moderating conflicts? The possibility for the regions to choose their own official language led to discriminations of minorities and a tyranny of the majority. To work in the local government office it became indispensable to know the particular official language. Because of this people were excluded from jobs only because of their lack of knowledge of a special language. For example in the urban region around Addis Ababa the Amharic remained the dominant language. This situation led to the homogenisation of the different regions and resettlement of minorities who were not able to communicate with the language demanded. Additionally the state had do deal with a difficult situation because he needed to connect the governmental needs and aims (e.g. the communication between the people in the whole country or the building of an Ethiopian Identity) with the demand for lingual autonomy (Emminghaus 1997: 113-127; Asnake Kefale 2003; Aaron Tesfaye 2002).

"The lingual autonomy encourages, consciously or unconsciously, the return to ethnic identity and a resulting upvaluation of it. […] …there evolves the risk of additional ethnic segregation due to the lingual autonomy" (Emminghaus 1997: 126 (own translation from German)).

Asnake Kefale (2002: 5-16) states that the implementation of the new political system was related with the problem of creating a state structure, which can manage the complex ethnic diversity of the country. The recent government conceived the ethnic federalism as the only possible way for the country's future but the process of federalisation was accompanied by a variety of tension and conflicts such as ethnic identity facing lingual homogenisation, fight for control over administrative structures or "ethnic territories", forced movements of "settlers" in a "foreign" area (e.g. *Amhara* People in *Roomier*) or the construction of regional state boundaries.

Concerning the effectiveness of the new system Asnake Kefale (2002: 20-22) considered it as very limited. There are many problems in the execution of the constitutional instruments because of lacking experience, dependency of politicians from their voting regions or the hegemonic and centralising tendencies of the political centre.

12.6 Social Sustainability concerning ethnic and social tension in the Ethiopian State

According to Wiesmann (1995: 9) the criteria of social sustainability, as a rule, comprise the possibility of spiritual, cultural and political expression or the protection of the diversity of socio-cultural values. In the following the specific Ethiopian

situation will be analysed in the context of this two main dimensions of social sustainability. On the whole, it can be said that the historical development of the Ethiopian state led to the formation of an ethnic and cultural heterogeneous country. There was and will be the need to keep the different ideas and values together with an appropriate and powerful instrument. Although the implementation of federalism seems to be a good approach to minimise the ethnic conflict potential, the pronounced ethnic focus implies a not negligible danger of disintegration. The small legitimation of the new constitution and the segregating effect of the new language policy both may destabilise the coherency of the multi ethnic state. Considering the criteria suggested above the new constitution does theoretically answer the needs of social sustainability. But it does not (yet?) assure the cohesion and the long-time existence of the Ethiopian state. Further efforts are needed to be made to stabilise the region at the horn of Africa.

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13 Economic dimension of sustainable development: market failure and development in Ethiopia

Compiled by Kaspar Hurni with feedback from Tewodros Assefa

Abstract

Agriculture plays a significant role in Ethiopia. 81 percent of the population works in the agricultural sector and it generates 42 percent of the GDP. With an average population growth rate of 2.5 percent and a quit stable share of arable land the goal of national food sufficiency emerges for an agricultural-led growth. This should be achieved by increasing productivity and market integration. However, limitations have to be overcome. Improvements in the transportation network, education and the health sector are crucial and a favourable market environment must be established that guarantees the information flow and supplies a favourable credit system.

13.1 Overview of the Ethiopian economic situation

Over the last 35 years Ethiopia's rural population grew from an estimated 23 million people (Gerster 1974: 35) to around 62 million people in 2005(CSA 2006), which results in an average growth rate of 2.9 percent. The contribution of the different sectors to the GDP over the last 3 decades shows a slight shift away from agriculture to the other two sectors. In 1969 agriculture accounted for 54.8 percent of the GDP (Gerster 1974: 36), while in 2002 the share of GDP covered by agriculture was 42 percent (Ludi 2006: 3). The diminishing contribution of the agriculture to the GDP can be explained by a high and only slow changing share of rural population and a quite stable share of arable land, showing only small positive changes. In 2002 81.5 percent of the labour force was working in the agricultural sector on approximately 110'000 sq km arable land (~ ten percent of country area). Taking the population growth into account, "the land-to-person ratio (i.e. land cultivated to annual and perennial crops / population in agriculture), which can be used as a rough proxy for farm size per capita, has decreased from about 0.51 ha in 1960-69 to 0.25 ha in 1990-99" (Ludi 2006: 3). The halving of the farm size per capita explains on one hand the diminishing contribution of the agriculture to the GDP. In a subsistence oriented system with little market involvement and diminishing plot sizes the ability of producing surpluses for the market is lowered. On the other hand the population pressure forces people to intensify production and give up fallow cycles which can lead to degradation and lower productivity, but at least guarantee partially the food supply.

The role agriculture plays in Ethiopia points out when looking at the external trade. Between 1980 and 2000 agriculture generated between 80 and 90 percent of the export revenue, with coffee covering roughly 60 percent of this share. Other important goods for export are pulses and oil seeds, and chat. This lopsided export structure, facing a rather inelastic composition of imports (fuel, food, capital goods and to a small extent consumer goods) combined with the worsening of the terms of trade, pushes Ethiopia towards an increasing current account balance deficit. It is a major obstacle to overcome this lopsided export structure and improve national market access and transaction cost, making exports profitable for small scale producers and reducing cost of import distribution.

Infrastructure and basic services, despite the efforts made in the last three decades, are on a low level in rural Ethiopia. The status quo seems insufficient regarding current theories relating social and economic development with road accessibility and availability of basic services. As Bharat P. Bhatta states for Tigray: "The study found overall better social transformations in locations with good access to road compared to poor access to road indicating that road accessibility crowds in other basic social services" (Bhatta 2004: 85).

Over the last decade a rather biased pattern can be observed in the development of social indicators and infrastructure in Ethiopia. On one side efforts were undertaken in the education: In the last decade the literacy rate in rural Ethiopia for people aged ten years and above has been raised from 18.3 percent in 1996 to 30.9 percent in 2004. Although 30.9 percent literacy rate can not be regarded as satisfactory, the growth rate of the variable is considerable.

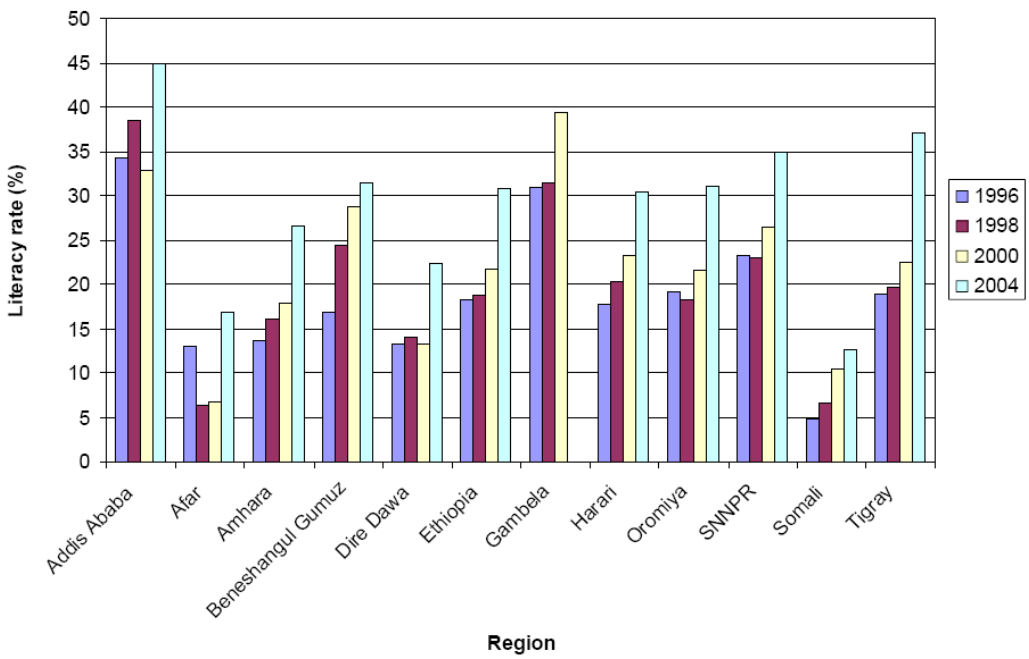

Figure 13-1: Literacy rate in Ethiopia (CSA 2006)

On the other side there are still big gaps to overcome concerning the health sector and transportation. The provision of health facilities in rural areas has not much changed in the last five years. In 2004 still one third of the population had a distance of over 20 km to the next health centre. Also in transportation it seems that much has to be done. For 2003/04 the length of the Ethiopian transportation network is assumed to be 36'728 km. As Eva Ludi states "most importantly, roads linking rural areas to market towns and to economic centres are poorly developed" (Ludi 2006: 12). A good net of transportation is crucial for the development. Not only economic factors like market access gain from a good road network, but also the social development is eased with good access to a region. This has also been showed for Tigray, as "schools and health centres were sparsely located and lacked trained and qualified human resources, equipments, and basic supplies. Consequently, Tigray was underdeveloped by educational and health services in terms of both quantity and quality. But it was better for households with good access to road. Road accessibility, household income, asset endowments and household characteristics significantly influenced households to enrol their children to school" (Bhatta 2004: abstract).

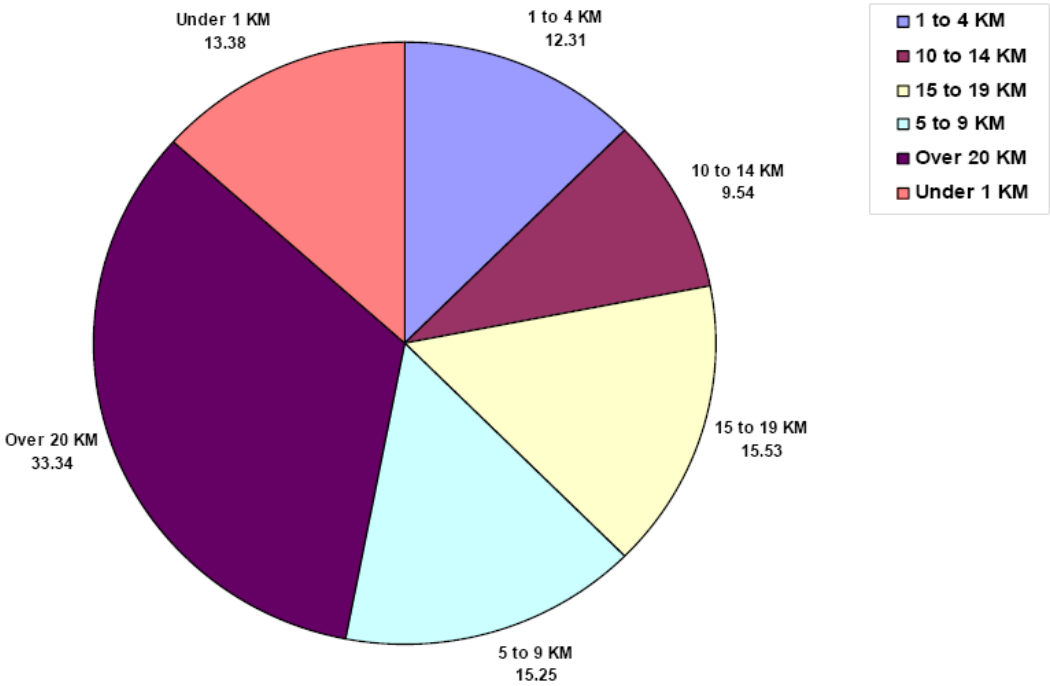

Figure 13-2: Households distance in km to the nearest health service or health centre in 2004 (CSA 2006)

13.2 The agricultural sector and development

13.2.1 The importance of the agricultural sector

After the dynamics of the Green Revolution in the 1960s agriculture was no more seen as low-productivity sector supplying labour and capital for the industry, but was considered as a growth sector itself. The importance the agriculture was assigned to is in the possibilities to:

- Generate more food and raw materials at lower prices
- Free up foreign exchange for the importation of strategic industrial and capital goods
- Provide growing amounts of capital and labour for industrial development
- With rising rural incomes, provide a growing domestic market for nascent national industries
- Reduce poverty by increasing labour productivity and employment in rural areas, by generating more remunerative opportunities for rural-urban migration, and by lowering food prices for all (Hazell and Diao 2005: 23)

These facts opened up new possibilities for an agricultural led development strategy in low-income countries. The growth of the first sector has leverage effects on the rest of the economy and can generate employment intensive patterns of development that are favourable for the poor and are favourably distributed between urban and rural areas.

Hazell and Diao (2005) distinguished five key conditions under which agriculture-led development is most likely to succeed:

- Agricultural growth needs to be technologically driven, so that output prices can fall while farm incomes increase
- Farmers need favourable incentives, as policies that distort the terms of trade against farmers hold back the entire economy
- Agricultural growth needs to be broad based, to make it economically efficient and to put more purchasing power into the hands of the rural masses, and not just a privileged few.
- Adequate levels of public investment in rural infrastructure are essential for promoting growth of the non-farm economy and rural towns as well as agriculture
- Markets and trade must be gradually liberalised, if the agricultural revolution is to translate into rapid and sustained national economic growth. (Hazell and Diao 2005: 23)

As the economic transformation evolves, agriculture's share in national income begins to fall and its importance for the economic growth diminishes. Workers in the agricultural sector must now be absorbed by the industry, to prevent the income of the first sector of lagging behind the returns in the other sectors. Improvements in labour

productivity in agriculture and favourable opportunities for rural-urban migration and economic diversification in rural areas are crucial for a successful transformation.

13.2.2 The African Challenge

Agricultural-led growth has played a big role in the economic transformation and at slashing poverty in Asia and Latin America. However, this has not been observed in Africa, where the base for a successful agricultural revolution is nonexistent or only marginally developed and factor productivity is low. "As a result, many African countries still face severe national food constraints, remain heavily dependent on traditional agricultural export markets (with declining and volatile prices) for most of their foreign exchange earnings, and have such small domestic markets for non-agricultural goods and services that their industries remain at an early and inefficient stage and are not yet ready to compete in liberalised markets. Poverty and food insecurity remain and continue to worsen" (Hazell and Diao 2005: 24).

These facts could emerge for a development strategy away from agriculture and focusing directly on industrialisation. It is stated that with improved global market access and globalisation small farms play a minor role in the development of a country. With low cereal prices small scale agriculture is not assumed to be competitive enough in the global market and thus the economy should focus on industrial development and imports of cheap food staples. However, this strategy ignores the status of the industry in most less-developed countries. Many African nations have small and inefficient industry plants, which should be integrated in an open market environment in order to achieve economic growth. But "not only are fledgling industries expected to compete with the world's best in export markets, but trade liberalisation is also a two-edged sword that also opens up domestic markets to imports that can decimate whole swaths of local industry before they have the chance to adjust and compete" (Hazell and Diao. 2005: 26).

With agriculture as the dominant sector in Ethiopia, providing approximately 80 percent of the employment, poverty reduction plays a key role besides the national economic growth rate. "Simulation results conducted at IFPRI with economy-wide models for Ghana, Ethiopia, and Rwanda show that given similar growth rates in total GDP poverty falls faster when growth is led by agriculture rather than industry" (Hazell and Diao: 2005: 28).

Another argument for agricultural-led growth and the focus on national self sufficient food supply is presented by Hazell, too. Many African countries are encouraged to import low-value commodities like food staples and concentrate on the export of high value commodities such as fruits, flowers, vegetables, and livestock. Even though there is potential in these markets for many African nations, the best possibility for farmers still lies in domestic and regional food markets. "Simulations with economy-wide models at IFPRI confirm this conjecture. (…) Because of its smaller base value, the productivity of the high-value, non-traditional exports has to grow at unrealistically

high rates (…) compared with the larger food staples subsector to achieve the same 5 to 6 percent agricultural GDP growth rate" (Hazell and Diao 2005: 31).

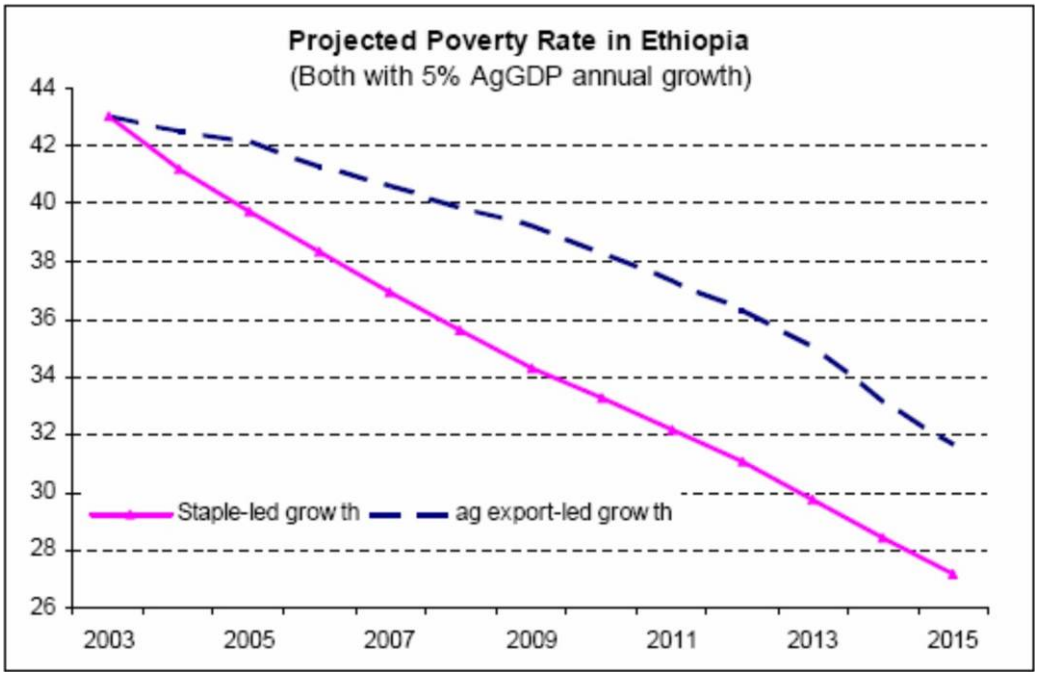

Figure 13-3: The choice of subsector matters for poverty reduction (Hazell and Diao 2005: 31)

Additional simulations have showed that investments in infrastructure to reduce market and transport cost can even increase the poverty-reduction impact of growth in food staples. Nevertheless farmers won't capture the share of food staple led growth on their own. Favourable legal basis and public investment to raise productivity and reduce transaction and market costs are crucial. This finding is also supported by the research of Bharat P. Bhatta: "Government policies towards prioritising the construction and maintenance of roads to provide a minimum of reliable and efficient transport access to rural communities in developing countries could be the appropriate development strategy for socioeconomic transformations since road accessibility crowds in other basic social and economic services and activities" (Bhatta 2004: 87).

Facing development and economic growth in Ethiopia thus emerges for a development in the agricultural sector which is subject to many constraints that have to be overcome. The following section shall give an overview over the land tenure system, the social system and the market.

13.3 Land tenure system

The dominant structure of Ethiopia's agriculture is household-based and small scale. Most of the farmers are highly subsistence oriented and if they have some surplus products they are mostly traded by other goods on small local markets. To understand the structure of the agricultural sector and the behaviour of most farmers a short overview is given over the historical processes concerning the land tenure system.

"Land is not only the primary means for ensuring a livelihood, but often also a means for accumulating wealth and social status and transferring them between generations. Because of this key role land plays in rural societies, the way access to it is regulated, land rights are assigned, and ownership conflicts are resolved, has broad implications not only in the agricultural sphere, but also for the overall social and economic development of rural societies. It is thus not surprising that the institutional, policy, and regulatory framework that governed in former times and governs today property rights to land and the way they are distributed is of great importance to the Ethiopian society" (Ludi 2006: 4).

13.3.1 The pre-revolutionary property regime

In the central and northern parts of the Ethiopian highlands, land was corporate property of a kin group. Two types of land tenure existed, the rist and the gult, which referred to the rights and duties of a person rather than ownership. The term rist describes a land ownership, where anyone has the possibility to claim land, if he is able to prove blood relation to the founder of the community. Thus any descent of a rist had principally the right to use a part of the corporate land. But the claim of rist was not directly linked with land occupancy. Children inherited the rist rights, but it was due to the decision of the corporation whether this claim was fulfilled and accepted.

This system of land tenure implied that land could not be owned as usual physical goods or the land in western industry states. The property regime was rather a fuzzy relation between corporate managed land and inherited rights of the members of the corporation. Distribution of land was mainly dependent from social factors as reputation, political power, family concerns, etc.

"The difference between gult and rist was a difference in the nature of the tenure, and was linked with the legal and political status of the person who received the grant of tenure" (Ludi 2006: 4). The gultegna (person who held gult rights) was allowed to collect tributes, taxes, and labour from the ristegnas (persons who held rist rights). A portion of the taxes collected from the farmers had to be remitted to the emperor. In return to this service a gult was granted to key political functionaries in local community level which was a reward for services performed and additionally an instrument of the emperor to ensure loyalty of his subjects.

Possibilities and limitations of the pre-revolutionary property rights (as listed by Ludi 2006: 5):

- If there was not enough land in one community (demographic pressure, land degradation, excessive taxes) one could seek to claim rist rights in another kinship group. Spatial mobility was on a high degree and cultivation land in different communities was a way of spreading risk.
- Political influence was linked to the amount of rist land an individual held. At the same time one was able to claim additional rist rights with augmenting political influence. Social mobility was thus high.

- Land access was determined that almost everyone had the possibility of cultivating a plot. There were only few landless farmers.
- In areas with minimal land reserves the problem of fragmented patterns of ownership arose due to the laws of inheritance (division of property among all heirs)
- Anyone could claim rights of use if he was able to prove closer relation to the descent group than the farmer currently exercising rist rights. This led to endless, time and money consuming conflicts and a rather short term oriented pattern of cultivation.
- Direct taxation of crop yields made investments not attractive and pushed the peasants rather to a strategy of self sufficiency.

13.3.2 Transformations following the revolution of 1974

"Following the 1974 revolution, Ethiopia underwent several years of rapid social and institutional transformation, during which land and major industrial, agricultural, and service sector enterprises were nationalised, a land reform was implemented, under which all peasant households were given access to cultivable land. The feudal order that prevailed prior to the revolution was replaced by socialist orientation" (Tekola Dejene 1990: 23).

Farmers were forced to join Peasant Associations with the goal of establishing an egalitarian, democratic, and participatory organised rural population with involvement in decision making. However, the Peasant Associations became rapidly an instrument of the central authorities to transmit orders and control the rural population. In 1979 farmers were obliged to sell quotas at a fixed price to the state, which in turn forced them to cultivate their land more intensely. Additionally it was not allowed to cultivate land in different Peasant Associations, migration was controlled strictly and the right to land was only granted if the major proportion of the income was earned with agriculture. Farmers had thus little to no incentive in diversifying their income.

Periodic redistribution of land gave farmers no increased assurance of their right to land and this uncertainty is often made responsible of holding farmers back in making efforts to conserve the land. The increasing burden of taxes, fees and quotas and the uncertainty about the land pushed farmers towards subsistence agriculture rather than participating in a market economy.

13.3.3 The transfer of power in 1991 and the farming system today

The transitional government emerged for a democratic system with broad participation by all segments of the population in decision-making processes. Private initiative should be stimulated and agriculture was seen as the cornerstone in the development of Ethiopia. Nevertheless land and natural resources were still owned by the state, which would grant long-term rights of use.

The structure of the agricultural system today can still be described as highly autarkic and household-based smallholders. "The strategy of relying as much as possible on own means of production and being only marginally integrated into the wider economy, can be explained by the fact that experiences made with higher market integration were often negative, as risks are considerable (…) and government policies changed frequently" (Ludi 2006: 8).

Eva Ludi distinguished four main household aims that tailored the farming system:

- Ensuring enough production to guarantee a livelihood in material terms for all household members
- Surplus production to ensure satisfaction of other material and non-material needs
- Accumulation of capital as an insurance against unforeseen events and to ensure the material basis of livelihood
- Fulfilment of social and cultural obligations to ensure social recognition and integration (Ludi 2006:8).

Crop growth is seen as the basic mean of food production, while livestock has the role of wealth accumulation and, in the case of oxen and horses, it is a drought power and means of transportation.

The farming system can be regarded as highly dependent on natural factors, especially climatic irregularities affecting the rain and the occurrence of diseases and pests. Small-scale farmers are thus highly vulnerable and rather focus on risk adverse strategies. This includes relying on "crop types and animal breed, which are less vulnerable, however at the cost of usually lower yields" (Ludi 2006: 10) and conducting a diversified land use system with high independence of external markets and low technical innovation.

13.4 External Factors

13.4.1 Community organisation and structure

Religious affiliation in Ethiopia divides up in three major groups. Orthodox Christians cover almost 50 percent of the population followed by Muslims (~30 percent) and Protestants (~18 percent). The remaining two to three percent of the population belong to Catholicism and other religious groups. In this section the focus is laid on the Orthodox Christians, as the Orthodox Church plays an important role in rural societies. "One regulative measure with a very strong influence on the economic possibilities of Christian farmers is that certain occupations, such as blacksmith, potter or weaver, are linked with religious affiliations (e.g. Muslims are blacksmiths, weavers or merchants, Jews are potters) and thus not open to Christian farmers" (Ludi 2006: 11). Christians are hindered in becoming economically active in the rural economy and development in terms of labour division in rural Christian areas is limited. Another restriction for the Christians is imposed by the religious holydays. There are only 140 days in the year

farmers are allowed to work without any limitations. Another 50 days have some restrictions related to farm work and the rest of the days are either Saturdays, Sundays or saint days where field work is not allowed. Farmers underlying these constraints face problems in organising their fieldwork. It is almost impossible to work the field more intensely and at the most favourable time. Especially for the poor the situation becomes difficult. Not only they have the religious constraints but they are also dependent from inputs of others like sharing agreements concerning oxen for ploughing the field. As the owner of the oxen will use it first, they have no chance to work their field at the optimal moment.

Religious associations play an important role in the social life of a community. Besides other functions they serve as 'social assurance' as "Mutual aid is strongly liked to these associations and respected by all members of the society. Thanks to this a certain redistribution of wealth takes place and it helps resource-poor members or households to gain access to necessary production means (e.g. draught oxen, labour). However, through the deep-rooted obligation to share, even modest increases in the income of an individual household are redistributed and can hardly be invested in more productive sectors of the rural economy" (Ludi 2006: 11).

The land use system is influenced by the law of inheritance. A farmers land is distributed to all his sons. With the increasing population cultivating roughly the same amount of land over the last 30 years the law of inheritance leads to high fragmented fields and diminishing plot sizes per capita. With this system at least every household has his own land, but it also hinders the people from looking for other employment opportunities outside the agriculture.

Muslim societies in rural Ethiopia face less restrictions, especially regarding economic activities. They "generally show a higher degree of specialisation, and more farmers are engaged part-time in handicraft and trading. Potentials for economic development in Muslim-dominated areas are in general better than in Christian-dominated" (Ludi 2006: 11).

13.4.2 Accessibility and Infrastructure

Facing development in Ethiopia accessibility and thus the transportation network is assigned a major function. Development strategies should focus on national food sufficiency through integration of remote rural areas into local and regional markets. Studies in Tigray showed that "Households located in remote areas were less likely to participate in markets so policies towards integrating remote areas with urban areas through infrastructure development are recommended" (Bhatta 2004: 87). Additionally improvements in the road network and its expansion crowd in other basic institutions, especially social ones like schools and health facilities and also financial institutions.

A basic need for a successful economic transformation process lies in education and a good health system (educated and healthy working force). Market integration and favourable conditions on the credit market are seen as major determinants to raise

productivity. Through the raise in productivity working forces are set free and have to be absorbed in the other sectors. Education plays a key role as on one side it gives options to farmers to become economically active and diversify their sources of income. On the other hand education is the basis for the transformation process, as the integration in the other sectors of the economy requires school enrolment.

In 2003/04 the length of the Ethiopian road network was 36,728 km with 18,406 km rural roads. Compared to 2002/03 the transportation network has been expanded by 18 percent for all the roads and even by 27 percent for the rural ones (CSA 2006). But the available data renders a bit suspicious, as for the period from 2001/02 to 2002/03 no expansion of the road network is indicated at all. Further investigations and collection of longer time series are needed to determine the growth of this variable and its impact.

Improvements in the transportation network is also a major determinant in reducing marketing cost in Ethiopia. Eleni Z. Gabre-Madhin showed that transportation covers 62 percent of the total grain marketing costs in Ethiopia. Additionally improved access to rural areas would lower the transaction costs, too and thus making market participation and also investment more profitable.

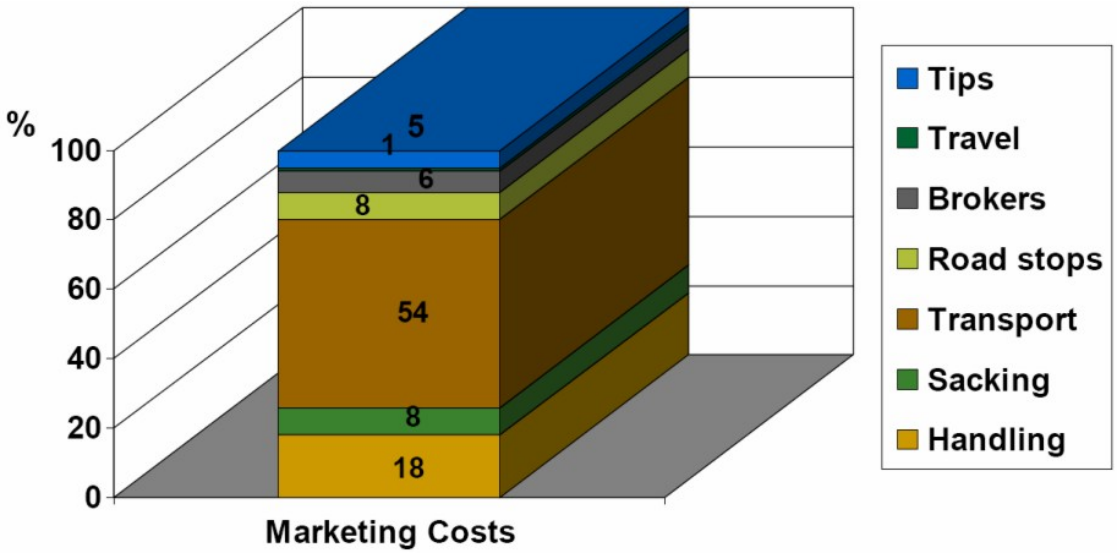

Figure 13-4: Composition of Grain Marketing Costs in Ethiopia (Gabre-Madhin 2005), which are 67 percent of market price (only 33 percent is farmers price)

13.4.3 Market environment

Improving market integration in Ethiopia and facing the option of food self-sufficiency emerges to increase the production on the available land. It can be expected that farmers have already exploited all possibilities to increase productivity and thus output can only be raised with a high input strategy. Markets are then needed to give the farmers possibilities to sell surpluses to compensate the higher expenditures from the production process. However, major improvements in the market environment are

needed to set this process off, because "relying on unstable markets is an extremely risky business for poor households living on the margin of survival" (Ludi 2006: 13).

Eleni Z. Gabre-Madhin (2001) distinguished six market components that need improvement to make market participation lucrative for the poor.

- Reduce marketing costs (transport; handling): As stated above transportation costs cover a 62 percent of total grain marketing costs, resulting in price spans that make selling or buying at markets economically unattractive (farmers only receive 33 percent of the final price, compared to 70 percent in Asia). This decreases the willingness of farmers to participate in the market and pushes them towards a subsistence farming system.
- Reduce transaction costs (search, information, enforcement, …): Transactions cover a share of 19 percent of total costs. A trader usually spends one to three days searching for potential buyers or sellers to complete the transaction. An organised grain exchange would reduce search time, coordinate market offers, and effectively screen market actors.
- Increase finance: "The missing credit market is a major obstacle to intensification and diversification of the farming system" (Ludi 2006: 15). As land can not be sold or mortgaged, only the government, traders or the church offer credits with a high risk premium to interest rates. Additionally farmers must pay back the loan immediately after the harvest (low cereal prices) and there is no insurance if farmers lose their harvest (weather, pests and diseases, etc.). As a result there is only a limited number of farmers conducting intensification through credits.
- Increase market integration (responsiveness): Increasing market integration means decreasing the time of the adjustment of the prices between markets in different regions and/or levels. Since the liberalisation market integration was found to be quite high, but increasing the responsiveness would reduce the search time. Sellers in surplus regions could sell at higher prices, while buyers in deficit regions would be able to get cheaper products without time lags due to the lack of information.
- Increase competition: Due to limited available information competition stays low. People rather trade with partners with whom they had prior personalised relationships in order to reduce the possibility of failure. Increasing information about trading partners (for example maintain record of traders' past behaviour) would reduce the importance of social relations and thus probably increase gains.
- Increase participation: To increase market participation the incentives for the trading partners must get higher, i.e. higher prices for sellers, more benefits for traders, and lower prices for buyers. This can be achieved by reducing transportation and transactions costs and stimulating the production for the market.

13.5 Conclusions

Developing the Ethiopian agricultural sector and achieving national food self sufficiency is a goal that can only be reached through efforts affecting the whole system. There exists a strong linkage between the social, political and economic spheres and development can only be achieved if they evolve mutually.

The farming system today can be seen as a good adjustment to the past evolutions in these spheres. A risk minimising strategy relying on self sufficiency seemed to be utility maximising. Frequent political changes and insecurity, low market integration and accessibility, and deep rooted social norms led to the preservation of the status quo. But the immense population pressure leads to frequent food insufficiencies and high rates of land degradation. It is thus indispensable to improve present farm practices and raise market participation. This section shall give an overview over development options of the different spheres and point out their interactions and dependencies.

13.5.1 Political Sphere:

For the development of the small scale agriculture the political system and the public sector play a major role. Political stability and reliability are seen as fundaments to economic growth. Active governmental actions should include increasing the accessibility, because linking rural areas better to the urban ones facilitates the exchange of goods and services, increases spatial mobility and supports income diversification. Additionally a good road access crowds in other factors as social institutions that help accelerating the transformation. The public sector should also provide most key services, as R&D, improved seeds, fertiliser, credit, storage and marketing. (after Hazell and Diao 2005: 32).

13.5.2 Economic sphere:

Policy implications for the economic environment should focus on increasing the market participation. Institutions are needed to link rural and local markets to national ones and to increase information. Rules and guidelines should be established to govern the behaviour of buyers, sellers and intermediaries on the exchange. Laws need to be formulated that address the conduct on the market and a system to assess the different standards of grains must be established. Generally improvements in the economic environment should face integration of the different market levels and improve reliability through different standards.

Institutional changes like these must go hand in hand with political actions to be able to integrate a large share of the population. Farmers need favourable conditions to start investing in productivity raising farming techniques. Political actions need to find a solution concerning the land property rights and a favourable credit system must be provided.

13.5.3 Social sphere:

The social sphere is probably the one where changes only occur slowly. Social values and norms and religious affiliation are based on a large time span and can not just be overcome. These values and norms have guaranteed over a long time security and integration and are thus of high importance for the individual and the community. Changes occurring in this sphere are bound to the evolution in economy and policy. If they prove to be reliable and secure and provide incentives a change is possible to occur and strict rules and limitations (e.g. the Orthodox Church) can be eased.

Nevertheless policy actions concerning family planning, the role of women and education can have impacts on the social system and foster the development and the market integration.

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14 Political dimension of sustainable development: historical and governance issues in Ethiopia

Compiled by Andreas Obrecht

Abstract

A long sequence of kingdoms and empires (the last emperor was Hayle Selasse) ended with a military coup. The military imposed a communist system called "the Derg" and ended with the feudal system. In the 1980s, famine and a civil war in the north led again to a change of power 1991. The government today is dominated by the EPDRF which was the driving force in overthrowing the Derg. Three national elections have been held so far. The way they have been conducted and how the government deals with the opposition have been heavily criticised but nevertheless an improvement over the years can be observed. Tensions with Eritrea still remain.

14.1 Introduction

The rich and long history of Ethiopia is characterised by charismatic rulers and a broad variety of political systems. Over centuries Ethiopia's leaders have withstood external threats and managed to keep the country together despite its different nations, cultures and religions. It has remained open for change and influences. Nowadays Ethiopia is affected by globalisation and new demands. The change to a democratic system is not easy, and finding a place in the globalised economy is challenging. The following essay is aimed at explaining the development to the present situation. It should be read very conscious of the relativity of words like "stability", "safety", etc., and the authors' choice of events more closely described.

14.2 Early political culture

The country's Official Name is 'Federal Democratic Republic of Ethiopia'. It is divided in nine states, including two administrative ones (Addis Abeba, Dire Dawa). The states are ethnically based and enjoy extensive constitutional rights. The Number of inhabitants for 2003 is estimated at 68'613'000 (FTV 2006) and 74'777'981 (CIA 2006).

Although the first forms of a nation have appeared 1000 years BC, the modern Ethiopia finds its roots in the enforced unification of the so called large Ethiopian Empire under the king Minilik II (1889 – 1913). In 1889 Addis Abeba became the capital.

Before, a situation with numerous governance systems was similar to the Holy Roman Empire in Europe. Territories of different ethnics were (and still are) not clearly separated and they intersect in big parts. Different **types of socio-political systems** existed until the 70s:

- **Imperial monarchy**: centralised power, feudal structures.
- **Centralised states:** Smaller kingdoms, divine rulers, village-states which were incorporated into the Ethiopian monarchy by force.
- **Sultanates**: located east of the Central Highland, long distance trade.
- **Age- and generation- grades**: A particular type of organising society in grouping the male in consecutive age-classes (e.g. eleven stages) which provide different services for their society. Every stage begins and ends with formal transfer ceremonies. Versions of this system evolved between the 16th and 19th century.
- **Clans**: Often divided in units. The clan becomes important on occasions such as war or rituals and for assistance in case of natural calamities like droughts. The Leader is defined by seniority and genealogy.
- **Segmentary kin-system**: No political rulers. The biggest unit is defined by familiar relations (Fellner 2000).

It was always difficult for rulers to centralise power due to the topography and strong local factors (Schwab 1985). The national concept was not strong but gained importance over the last centuries when the neighbouring countries were colonised by Europeans.

The following table gives an overview of the early political history up to present:

Table 14-1: Timeline (compiled by Andreas Obrecht)

Time	Name of period	System	Important Leaders	Description	Area	Capital
100 (?) -700 AD	Axumite Kingdom	Kingdom	Ezana (4th AD), Kaleb (6th AD)	One of the most advanced civilisations of its time. Trading with India, Arabia, Persia, Rome. Constr. of big steles. Descendents of Salomon and the Queen of Sheba reigning.	Nile-Port Sudan-Berbera	Axum
~400				Coptic Christianity introduced from Egypt.		
700- 1270	Et's dark age; Zagwe Dynasty		Yodith (10th)	Revolt of Yodith. New dynasty. Increasing isolation, growing importance of the Ethiopian Church.	The territory changes a lot. Sometimes it even compromises parts of the Arabian Penninsula	Floating capitals
			Lalibela	Rock-hewn churches. Influence over jewish communities		
1270-1528	Solomonid dynasty		"kings of kings" reigning	Again Solomonid dynasty in power[1]. Portuguese influence.		Amhara and Shewa
1528-1560	Muslim-Christian War			Muslim leader Ahmad Gran conquers much of Ethiopia.		
1635-1855	Gonder period	Empire		Ethiopia closed to foreigners. Also called Era of the Princes.		Gonder
1855-1868	Emperor's Period		Tewodros II (1855-1868)	Tewendros defeated by Brithish expeditionary force.		
1868-1913			Yohannis IV (1872-1889), Menelik II (1889-1913), Lij Iyasu (1913-1916), Zawiditu (formal reign: 1916-1928)	Yohannes IV: Tigrayan rule, killed in combat and succeeded by the king of Shoa who becomes Emperor Menelik II.	Abyssinia: Today's territory excluding the low lands	
1889				Bilateral friendship treaty with Italy. Italy considers Ethiopia from now on as protectorate.		Addis Ababa
1895-1896				Invasion of Italy, but are soon defeated by Ethiopians.		
1913-1936	Selassies Reign		Ras Tafari Makonnen till 1930, then Haile Selassie I (1913-1974)		Today's area	
1936-1941	Italian occupation			With help of the Ethiopian resistance (arbegnoch) the Italians are defeated by the allies and H.S. is brought back to power.	Ethiopia, Eritrea (since 1962), Part of Somalia	
1941-1974	Post-war Ethiopia		Haile Selassie I	First huge famine in Wallo province.	Today's area and Eritreas territory	
1974-1991	Derg period	Communist Rule	Teferi Benti (1974-1977), Colonel Mengistu Haile Mariam (1977-1990)	H.S. overthrown in a military coup. Dies 1975 in custody. "Red Terror" kills thousands opponents. Tigrayan People's Liberation Front launches war for regional autonomy.		
1977				1977-1978 Somali occupation of Ogaden region		
1985				Horrible famine, especially in the north.		
1990-today	Modern period	Provisional Gov.	Meles Zenawi (Prime Minister)		Today's area	
1991	EPRDF Rule			Mengistu in exile.		
1993				Eritrea becomes independent.		
1994				New constitution divides Et.:ethnically-based regions.		
1995		Democracy	Meles Zenawi (Prime Minister)			
1998-2000				War with Eritrea		
2000				Funeral of H.S.		
2005				Most recent election, EPRDF wins		

This overview bases on data from http://news.bbc.co.uk, http://en.wikipedia.org/, Ethiopia 4th edition 2005 - Bradt Travel Guides Ltd., Schwab 1985

1) This is not to be taken too literally. Succession was rather arranged by arms.

14.3 Hayle Selasses Reign

14.3.1 Ras Teferi Mekonin

Hayle Selasse's father was Ras Mekonin, a leading figure and a relative of Emperor Minilik II. On 23 July 1892 his 10th son, Teferi Mekonin (baptised with the religious name Hayle Selasse), was born near Harer. At the age of 13 he already joined the ruling class by becoming governor of a small region southwest of Harer. Since that time his father did his best to put him as close as possible to the Emperor. By the time the Emperor died, Teferi has already become a very important person.

Through a succession of favourable events (i.e. wars, in which he succeeded) and thanks to his good relation to powerful people he made a quick political career as adviser to the Empress Zewditu, the successor of Minilik II, and became even more popular then. To his advantage, the Empress Zewditu was under huge political pressure. To get rid of responsibility, she declared him Crown Prince and regent in 1916. He already was the de facto ruler of the country. He confirmed his power through a couple of successful wars. After the sudden death of the Empress, Teferi in 1930 was declared Emperor Hayle Selasses, which was his baptismal name (Marcus 1987).

14.3.2 The Emperor

Hayle Selasse was a legendary, a fairy-tale like emperor. He owned several palaces all over the country, employed a rank of servants, claimed to be descendent of Salomon and the Queen of Sheba. He held huge receptions including heavenly meals and travelled all over the world (Signer 2005).

Another fact adds to Hayles fame: The **Rastafarians** (based on H.S. birth name) are convinced that Jesus was god himself. His return was predicted in Jamaica in the 1920s by the religions founder Marcus Garvey, saying that a "black god is going to be crowned". Three years after this prediction, H.S. has become emperor (Signer 2005). The link between Jamaica and Ethiopia has not been strong and worked rather on an emotional level. The true situation in Ethiopia has been filtered out by the Rastafarians.

H.S. used these intercontinental ties and his growing influence to try strengthening pan-african feelings (Olschewski 2003). The emperor was skilled in blinding out reality. He was not aware of poverty and famine and was living in a made up glory of the past. The administration was very centralistic, the police strong and feudal structures still persisting. His reign was interrupted by the **invasion of fascist Italy** (1935): he spent his exile in Bath, GB, (Marcus 1987) until Ethiopia was freed by the Allies in 1941.

The second part of his reign ended with the military revolt described in the next subchapter. H.S. died on 22 August 1975 in custody - most probably killed by his captors - with his body lost for the years to follow until it was in 1992 discovered. Today's estimation of Hayle's reign is rather ambivalent. Compared to the following

Derg Period, the emperor's time was not so bad (Signer 2005). The public attention at his burial in the year 2000 (Biles 2000) was impressive.

14.4 The Derg Period

14.4.1 Military Coup

It was 1974. People and troops were tired of Selasse, the feudal system and corruption. This combined with famine and economical problems caused a new unrest to spread among the population. The uprising first came from hungry soldiers protesting for food and water. Soon they found support throughout the army and up to higher levels. The following riots caused the Prime Minister to resign. A revision of the constitution was announced; but the new government did yet not include the groups pressing for change and did not introduce any substantial reform. Then, a group of 120 officers, looking for a far-reaching change, formed the new Coordinating Committee of the Armed Forces, Police, and Territorial Army which was later going to be called 'The Derg' - Amharic for 'committee' (Schwab 1985). This informal group elected Major **Mengistu** Hayle Mariam as chairman. At first, the officers exercised their influence behind the scene. Like this they gained power over more and more troops and started to arrest exponents of the old regime. This pressure, supported by the public, led to some political reforms. Selasse had to give in more and more. The Derg started to nationalise feudal ownership. The huge protests following the (justified) accusations of the Emperor being responsible for the recent famines, led to Selasses imprisonment without his resistance on the 12 September 1974.

14.4.2 The Derg in Power

Three days later the Derg took control over Ethiopia. An Ethiopian socialism policy was implemented on the 20 December 1974, called Ethiopia Tikdem in which the parliament was deprived of its power. Following that, the Derg was affected by internal controversy during which Mengistu was able to strengthen his power. When the Derg first took power, decisions were as far as possible made on a democratic basis. But to confirm his power, Mengistu started to brand more and more opponents as labelled counter-revolutionaries. Mengistu was ready to use as much violence as needed to impose socialism. Even most of the members of the original Derg have been killed. This period between 1977 and 1978 was characterised by the "Red Terror", a systematic "disappearing", executing and capturing of a huge number of opponents including religious leaders. In 1978 under a new constitution, the Derg and its institutions was transformed to the "Workers' Party of Ethiopia", the WPE and the Marxist-Leninist ideology was officially adopted. A friendship treaty with USSR was signed which ensured military support but did not have furthermore effects (Schwab 1985).

During the Derg-Period, a slight change in culture happened. This period was characterised by:

- A stronger concept of national state.
- The empowerment of women.
- The shift from a feudal to a state (and partly private) ownership system.
- Increasing power of the army.
- Education campaign which leads to an improved educational standard.
- An enforcement of education in rural areas and improvement of health care.
- The occupation of influential positions by party members.
- Ethnicity not being an issue at all.
- A weak growth of GDP (~0.4 percent); decline in food production compared to 1970. The land reform was only a political success.
- The administration of urban land had to be done by cooperatives/urban dwellers associations, the "Kebele". The Kebeles were in charge of all the local administrative affairs including issuing passports. This could be used by the Derg to control the population. The power of independent acting Kebeles was limited by the Derg.
- The one house per person policy.
- The silencing oppositional voices.
- Resettlements and land redistribution.

14.4.3 The end of the Derg

Already in the 1960s, Eritrea's liberation war started. The movement there was led by the Eritrean People's Liberation Front (EPLF). Ethiopia's Communist Party, the WPE, lost its civil influence and military potential in Eritrea due to the high cost of war and environmental problems such as drought and famine. The hungry people were misused by Mengistu to receive western aid which was partly used by the army (Franschhoek 2005). The war was also destabilising Ethiopia's north; namely Tigray. The resistance movement TPLF (Tigray People's Liberation Front) under the lead of Meles Zenawi developed. Both the EPLF and the TPLF worked together (which explains the peaceful separation of Eritrea later on) but the aims were different. The TPLF was, as well as the WPE and the EPLF, Marxist-Leninist but they emphasised a development from within and the TPLF was looking for a political change, not independence. The TPLF knew that it was economically impossible for an independent Tigray to survive. The Tigray people represent only 7% of the total population of 90 ethnic groups. Together with other oppositional parties like the EDU, OLF, ALF and EPRP they formed the EPDM and later the EPRDF. In 1989 Mengistu lost Russian support. The EPRDF, which had already control over the north, entered central Ethiopia. Although the EPRDF consisted of many separatist parties like the OLF, the leading TPLF set the path for a pan-Ethiopian solution. The EPLF conquered 1990 Eritrea's main port Massawa.

To resume: When the EPRDF finally reached power in 1991, it consisted of a leading Tigrinyan (minority) party (TPLF), an Amharic led pan-Ethiopian party (ANDM) and

the moderate nationalist Oromo party the OPDO. Other allies like the OLF got out of the EPRDF after the fall of the Derg.

The taking over started with a common attack from the EPRDF and the EPLF against Mengistu in Feb. 1991. The army surrendered in Asmara on the 24th of Feb. Mengistu fled to Zimbabwe where he still enjoys protection of his friend Mugabe. The EPRDF was pushed by the US to take over the capital town and to reinstall public order, which was possible without major bloodshed. Meles installed an interim government in which he was president. The WPE was being disarmed. But the southern part of Ethiopia was not under control yet (Fellner 2000; Raupp 2006).

14.5 Current Politics

Today's Ethiopia has roots in the late 1980s. In July 1991 a national peace conference left the power to an interim government for two and a half years. This provisional government corresponded roughly to today's government. In 1992 the first elections, regional ones which did not match international standards, took place (NZZ 1994a).

14.5.1 The Constitution of 1994

As had been decided in the peace conference, a referendum in 1994 gave Ethiopia a new constitution – just before the first national elections. The Constitution of 1994 calls for a Parliament of two chambers: The House of People's Representatives with not more than 550 seats (currently 547 seats) and the House of Federation with a non-specified seat number (planned 108 seats) (Ethiopian Parliament 2006).

The change in the system led to a redistribution of the regions into ethnic-based ones and to the liberalisation concerning product prices and harvesting. Eritrea's independence was not agreed upon by everyone, and differences between Amhara and Tigray people led to unrest (NZZ 1994b).

Key points of the Constitution (FTV 2006; Ethiopian Parliament 2006) were:

- An Ethiopian Federal republic.
- Nine States "delimited on the basis of the settlement patterns, language, identity and consent of the peoples concerned" (Art. 46, constitution '94) and two self-governing administrations: Addis Abeba and Dire Dawa.
- The states have the right to establish their own states, at any time.
- Division of powers between the People, the States and the Federation.

The first election following the referendum was harshly criticised by international observers. Characteristic for this election was the weakness of the opposition including the conversion of some parties to the government's side. Today, the government agrees that the 1995 and 2000 elections were not 'fully democratic'.

14.5.2 War with Eritrea

The main reason for this terrible war in 1998 is the demarcation of the border which is very unclear. The war was conducted WWI-like with trenches but with modern weapons. This led to tens of thousands of dead combatants and civilians. Nearly one million people have been displaced. A ceasefire agreement was signed in June 2000; a demilitarised zone guarded by UN peacekeepers and observed by the OAU has been installed. Half a year later a peace treaty followed. The peace process proceeded with defining the border until 2003 when the Boundary Commission decided that the town of Badme lies in Eritrea. Ethiopia does not accept that and keeps its troops in the town up to present (December 2006) (Ethiopia Country Review 2006).

14.5.3 Legislative elections 2005

The last elections have been criticised by various organisations and some foreign governments. Please refer to the EU observation mission's final report for further reading. The first Election Day was 15 May 2005. Logistic problems have forced the government to conduct the elections in the Somali region finally on 21 August 2005.

Before the elections, Human Rights Watch (2005) reported that not all Ethiopians will be able to participate in the elections. Especially in Oromia, citizens have been unable to express their political opinions and to form strong political groups. Human rights groups described the political situation as a big confusion in which the OLF fights against the EPRDF. Smooth force was used by the Kebeles which exist and functioned as electoral districts. Founded in Derg times, the Kebeles are still responsible for most administrative tasks and have therefore a lot of influence over the voters (Iten 2005). Opposition candidates had to handle logistical problems as well: Some had to campaign on foot. Many voters had no information about the candidates (The Economist 2005).

Nevertheless a remarkably open pre-election debate took place (Link 2005). While the voting itself was described by the EU (which was invited by the government upon EU's suggestion to observe the elections) as "the most genuinely competitive elections the country has experienced in spite of a number of restrictions on the full exercise of political rights and some violations of human rights in the pre-electoral period." (EU 2005a), the following counting and aggregation was later evaluated as "marred by irregular practices, confusion and a lack of transparency […].The human rights situation rapidly deteriorated in the post-election day period when dozens of citizens were killed by the police and thousands were arrested" (EU 2005b:4).

Generally speaking, the EU report points out a broad variety of problems (among them: biased media, very heated rhetoric, slow counting, delays, insufficient training of staff, lack of material, intimidation). A high level of people's participation has been positively remarked – 85 percent of the eligible population, actually 25 million voters and 48 percent women (most Ethiopians are minors), have registered (EU 2005b).

The African Union (AU) and the Carter Center have been observing the elections as well and have issued less critical - but also less comprehensive- reports. The AU with

seat in Addis Abeba stayed silent for a long time until 40 demonstrators have been killed during an AU meeting held in Addis in late 2005 (Lacey 2005).

Since the elections 2005, protests hit Ethiopia every now and then. Often they are suppressed by the police causing lots of casualties. The opposition justifies the protests as the only way to communicate with the government since their leaders had to go underground or were being arrested. Still, the EPRDF enjoys quite high esteem of western governments. Most international observers have acknowledged EPRDF's victory except the EU. A Reason for this could be the relative stability in Ethiopia which is higher valued than human rights (D'Anna-Huber 2005).

14.6 The 2005 Government

All the following data is provided by Ethiopia's government and is highly doubted by the oppositional parties, NGO's, the EU and international observers such as journalists. The terms "lost" and "win" have to be understood cautiously as they are mostly expressed in the government's point of view. The description of the parties is the author's impression gained by the lecture of numerous press articles.

14.6.1 Head of State:

The present Head of State (elected on the 8 October 2001 for a six year term) is President **Girma Wolde Giorgis**, a man with an interesting political biography. He was EPRDF's candidate. Giorgis is born 1924. The President is elected by a joint session of the House of Peoples' and the House of the Federation. He must get two thirds of the votes and can be elected for at most two terms. His duties are solely representatives, without any further rights such as dissolve the parliament for instance (Ethiopian Parliament 2006).

14.6.2 Executive Body:

The House of People's Representatives elects the prime minister among its members. The prime minister is going to "submit for approval to the House of Peoples' Representatives nominees for ministerial posts among members of the two Houses or among persons who are not members of either House and possess the required qualifications" (Ethiopian Parliament 2006).

Chief of the Government is **Ato Meles Zenawi** (EPRDF). He is the prime minister since the EPRDF victory and therefore criticised. His strong left-wing background has not deterred him to implement some liberal reforms and although he is not a model democrat, progress has been made. Whether Zenawi is involved in corruption is unclear. Zenawi enjoys high esteem by some world donor countries. Tony Blair chose him as member to his Commission for Africa (Biles 2000; Kunath 1997; Lefort 2005).

14.6.3 Legislative Body

This section is mainly based on information from the Ethiopian Parliament (2006) and the CIA World Factbook (CIA 2006).

Governing Parties:

The following four parties form the governing EPRDF-Party (Ethiopian People's Revolutionary Democratic Front):

- TPLF : **Tigray** Peoples' Liberation Front
- ANDM : **Amhara** National Democratic Movement
- OPDO : **Oromo** Peoples' Democratic Organization (see OLF chapter)
- SEPDM: **Southern Ethiopian** Peoples' Democratic Movement

The EPRDF is the leading party since May 1991. It has lost some of its power in the last election. EPRDF's victory has not been accepted by the opposition. The EPRDF is rather left-wing, TPLF-dominated and not interested in a healthy opposition.

Parliamentary Opposition:

The following four parties belong to the **CUD** (Coalition for Unity and Democracy):

- AEUO: All Ethiopian Unity Organization
- UEDP-MEDHIN: United Ethiopian Democratic Party-MEDHIN
- REMDSJ: Rainbow Ethiopia Movement for Democracy and Social Justice
- EDL: Ethiopian Democratic League

The CUD promotes a liberal economy including land ownership by farmers. It is not in favour of Eritrea's independence and distrustful of the ethnic federalism.

Another coalition is the **UEDF** (United Ethiopian Democratic Force):

- AAPO: All Amhara People's Organization
- EDU: Ethiopian Democratic Unity (founded against land nationalisation during the Derg mostly by former aristocrats)
- Ethiopian Social Democratic Federal Party
- Oromo National Congress
- Southern Ethiopia People's Democratic Coalition

Another nine parties of this coalition are in the Diaspora (EU 2005b: 10). The UEDF is very critical on the EPRDF. This also seems to be the main 'program' of the UEDF.

Small Parties:

- SPDP : Somali Peoples Democratic Party
- OFDM : Oromo Federalist Democratic Movement
- BGPDUF : Benshangul -Gumuz Peoples Democratic Unity Front
- ANDP : Afar National Democratic Party

Very small Parties ("Others"):

- GPDM : Gambela Peoples Democratic Movement
- ANDO : Argoba National Democratic Organization
- HNL : Harrari National League
- SMPDUO: Shecko Mejenger Peoples Democratic Unity Organization

Opposition, not in Parliament but recognised:

All the following parties are separatists:

- ARDUF: Afar Revolutionary Democratic Union Front
- OLF: Oromo Liberation Front (see subchapter 14.7)
- ONLF: Oromo National Liberation Front or ONLF
- ALF: Afar Liberation Front; Founded during the Derg period to fight against land nationalisation.

There are groups and parties which are not recognised by the government. One example is the IFLO: Islamic Front for the Liberation of Oromia. It disagrees with the OLF over the use of force and is more militant (NZZ 1994a). Separatist groups, many of them with terrorist tendencies, exist everywhere in the country.

House of People's Representatives

The people's representatives are elected every five years (last held 15.5.2005).

EPRDF	327
CUD	89
UEDF	52
SPDP	24
OFDM	11
BGPDUF	8
ANDP	8
Independent	1
Others	6
Undeclared	1
Not appeared	20
	547

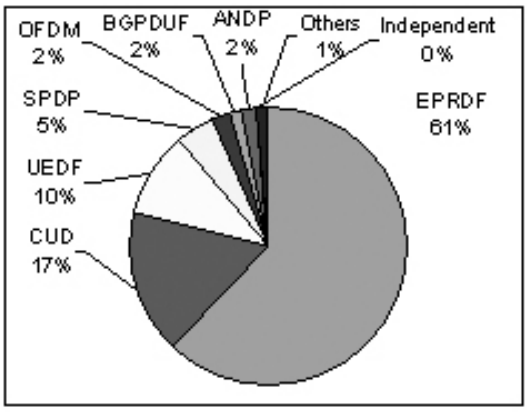

Figure 14-1: Political affiliation of the House of People's representatives (CIA 2006; Ethiopian Parliament 2006; own illustration)

House of Federation

The House of Federation consists of designated members chosen by state assemblies or the people of a state (it's up to the state) for five years. This happened 1995 for the first time. Ethiopia's constitution states that each nation (at present 58 nations) is supposed to be represented by at least one delegate plus one additional delegate per million inhabitants (Ethiopian Parliament 2006).

Table 14-2: Members of the House of the Federation (Ethiopian Parliament 2006; own illustration)

State	Ethnic Group	Nr of Delegates	State	Ethnic Group	Nr of Delegates				
Tigray	Tigray	4	**State of the Southern Nations**	Yem	1	Shekicho	1	Hadiya	2
	Kunama	1		Kenbata	1	Kaficho	1	Kore	1
	Erop	1		Alaba	1	Gedio	2	Gurage	3
Afar	Afar	2		Dasenech	1	Sidama	3	Mareqo	1
Amhara	Amhara	14		Hamer	1	Surema	1	Qebena	1
	Agew Hemera	1		Tsemay	1	Chara	1	Gofa	1
	Agew Awi	1		Gedicho	1	Nao	1	Gamo	2
	Oromo	1		Burji	1	Gnangatom	1	Welayeta	2
Oromia	Oromo	16		Basketo	1	Male	1	Dawero	1
Somalia	Somale	3		Oyeda	1	Arie	1	Konta	1
	?	1		Zeyese	1	Zulemam	1	Tenbaro	1
Benshangul/Gumuz	Mao	1		Derashe	1	Bodi!	1	Dizi!	1
	Gumuz	1		Mashele	1	Dime	1	Mursi!	1
	Komo	1		Kuseme	1	Meanit	1	Bench	1
	Shinsha	1		Gewada	1	Sheku	1	Erbore	1
Gambela Peoples' State	Agnuwak	1							
	Nuer	1							
	Mejenger	1		**Total Delegates:**			107		
	Upo	1							
Harari Peoples' State	Hareri	1							

Judicative body

Ethiopia knows federal law and state law. State jurisdiction concerns all regional mattes as federal law concerns national matters. Federal courts include: The Federal Supreme Court, the Federal High Court, and the Federal First Instance Court (Ethiopia Country Review 2006).

14.7 Assessment of the actual political landscape

The present situation in Ethiopia is quite stable, but the apparent stability stands on shaky ground. The governing party, **EPRDF,** represents a minority and it's legitimacy of power is highly doubted by the oppositional groups.

Protests have been oppressed. Some oppositional groups are armed. Problematic are the ethnical constitution of the states and the self-definition of most parties by the aim of the "liberation" of a certain ethnically based territory. Especially difficult in this

context is the indication of ethnic background in official personal documents (D'Anna-Huber 2005).

The protests following the 2005-elections in 204 locations from June to November have been investigated by an independent commission. The commission resumes in its report the detention of 30'000 people, the loss of 193 civilians and 6 security forces, the injury of 763 civilians and 71 security forces. It's conclusion is: "actions taken by the security forces to control the violence was a legal and necessary step to protect the nascent system of government and to stop the country from descending in to a worse crisis and possibly never ending violence" (Independent Inquiry Commission 2006).

Oppositional groups

Most oppositional parties pursue independence of their home country and disagree with Eritrea's independence which is incoherent. There is not much working together among those groups. The programs of the opposition for a big part limit themselves in being against the government. More disputed points are land ownership and international relations namely with the west. Critics of the government often concern the reliance on foreign aid. An OLF- exponent points out the fear of the west what may follow the EPRDF ensures the political support. A view shared by other observers (Human Rights Watch 2005; D'Anna-Huber 2005).

The OLF (Oromo Liberation Front) is the most important oppositional group. It lost in the regional elections and sled into crisis (NZZ 1994a): The OLF claims to be a secular, armed political organisation. It was founded 1973. Its goal is a bit unclear. Apparently it ranges between some form of self-determination and complete independence of "Oromia". The official representation of the Oromo people is now provided by the OPDO, founded by the EPRDF. The OLF desires a peaceful resolution to the problem. It has an armed wing though which - they claim - is just used for "self-defence" and no terrorist activities (OLF 2006).

The chance of the opposition to form an alliance is rather small since the common goals seem to be limited to just one: The ousting of the present government.

The press situation today

Media is dominated by the state which manages Ethiopia TV, the only one, a radio station (Radio Ethiopia), a national news agency (Ethiopia News Agency, ENA) and three out of four daily newspapers: The Ethiopian Herald, Addis Zemen, Baarisa.

Some other media and news agencies are also strongly connected to the government. Media enjoys theoretical freedom of press. Ethiopia has dropped in the 'Reporters sans frontiers freedom index' ranking from 112 in 2004 to 160 (of 168 countries) in 2006 (Reporters sans Frontières 2004, 2006). The governments attempts to restrict independent press. For instance, after the latest elections, 129 leading opposition politicians and journalists have been accused of treason and other charges (The

Economist 2006). It has to be remarked that access to newspapers is rare, internet connections are slow and international magazines are almost impossible to buy. Most of the people have therefore to rely on radio and TV transmitted information.

Trials

The Ethiopian society is also dealing with the Derg heritage. Since 1995 there have been a couple of trials trying to judge the huge number of accused. First in 1995, a trial began about the first group of accused, the political responsibles for the 'Red Terror' including Mengistu (Iten 1995). It lasted 12 years. Finally, in 2006, Mengistu (and others) has been found guilty of genocide in absence (NZZ 2006). In 1997 the second group of accused, the direct responsible who gave the orders, were started being judged. The trial about the third group, the executers, is still to start (The Economist 2006).

Foreign Affairs

Relations to the West have cooled down since the latest elections but are still remarkably good (Lefort 2005; Lacey 2005). Ethiopia's government can rely on western financial and political support. Tensions with Eritrea continue (Signer 2005; Pelda 2005). In December 2006, Ethiopia supported the Somalia interim government in regaining Mogadishu and southern Somalia from the Islamists. Ethiopia managed to confirm its status as an US ally in the 'war on terror' and as main power in the horn of Africa. The Zenawi government has proved itself to be a reliable partner and will be therefore more immune against criticism (Christen 2006, Dietrich 2006).

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15 Institutional dimension of sustainable development: traditional and modern state issues in Ethiopia

Compiled by Stefan Salzmann

Abstract

Different actions between different parties within a society take place in the predominating institutional framework. Institutions define what activities are permitted and what the limitations are. In this chapter, institutional dimensions are analysed on a general country level and combined with personal experiences made in Ethiopia. The six fields are education, elections, federalism, infrastructure, property rights and farmers. I conclude that enhancing the institutional setting affecting the small scale farming population will have the biggest effects because these farmers represent the majority of the Ethiopian population. Equal education combined with a stepwise introduction of property rights to arable land could lead to incentives towards sustainable land management and more individual creativeness, beyond subsistence farming. Enhancing the situation of the majority of the people, in my opinion, is also the best way to enhance the situation of the country as a whole.

15.1 Introduction

'Institutio' as a latin word originally means 'arrangement', 'education' or 'guidance'. Today, institutions could be seen as mechanisms of social order and cooperation governing rules of cooperative human behaviour within a society. They are made up of formal constraints (rules, laws, constitutions or religion), informal constraints (norms of behaviour and habits, conventions or culture), and their enforcement characteristics. Together they define the incentive structure of societies and especially economies.

'Differences in institutions across countries have proven empirically to be among the most important determinants of differences in rates of economic growth' (Vijayaraghavan and Ward 2001: 1).

North (1990) interprets a lack of possibilities to achieve contracts as a source of underdevelopment. Institutions are described as the humanly devised constraints that structure human interaction. North mentions that institutions and the technology employed determine the transaction costs that add up to the costs of production. Functioning institutions should diminish these transaction costs because only

bargaining under the condition of low costs (no costs at all in the best case) leads to a maximal total income. Further on, players must know the correct way of how to achieve this. To find this 'correct' way is difficult if not impossible. Perfect (political) markets don't exist at the moment and therefore a market with zero transaction costs is inexistent. But an interaction between institutions as the rulers and the entrepreneurs as the players shapes the institutional evolution of a society (North 1990, 1993). Keefer and Knack (1995: 207) wrote continuative, as explanation for under-development, that the absence of secure property and contractual rights discourages investment and specialisation. Property rights are central in their estimation and the impact on investment and growth is analysed. These are not the only forms of institutions discussed in present literature. Other estimations in the field of economics treat constitutional aspects, laws, trade policy, political institutions (such as democracy, political (in-)stability, political freedom, governance etc.) or the education system. Incentives are a central aspect in political economics as well as in mainstream economics and they are one reason why institutions have regained importance in discussions about performance of economies: prosperous institutions give incentives for the subjects of an economy to maximise welfare. Several organisations as actors include political bodies (parties, the senate/congress, the city council, regulatory bodies), economic bodies (firms, trade unions, family farms, cooperatives, households, individuals), social bodies (churches, clubs, athletic associations) and educational bodies (schools, universities). All of them act inside the given institutional design and enhance them simultaneously (Stephenson 2004). A growing body of researchers is showing that development is strongly affected by the quality of appropriate institutions. The interests among economists concerned with institutions and economic growth has led to a new aspect of mainstream economics, namely institutional economics as a part of it. Institutional economics view markets as a result of interactions between various institutions. To judge the quality of institutions, indicators out of the wide field of possible measurements have to be chosen. For example Vijayaraghavan and Ward (2001) estimated effects of institutions on economic growth. They include a broad set of institutional variables, which altogether represent the overall institutional infrastructure of an economy. Four measures of institutional infrastructure were used: 'security of property rights', 'governance', 'political freedom' and 'government consumption' and the attempt is made to identify the institutions that appear to be the most significant source of differences in economic growth rates. Data of 43 countries are analysed, nine of them are developed countries. Results indicate that security of property rights and size of government are the most significant aspects explaining the variations in economic growth rates. Secure property rights provide incentives for economic growth and lead to an efficient allocation of investment and to an efficient use of capital. The results also seem to indicate that less government consumption has positive effects on economic growth.

In this chapter, different institutional dimensions are analysed, both in a general aspect and in context with experiences in Ethiopia concerning the prevailing Ethiopian institutional design. The methods used are analysis of relevant literature and personal observations during the study tour.

15.2 Institutional dimensions

In the following, the actual institutional design in Ethiopia and possible improvements shall be analysed. The focus lies on six dimensions within the field of institutions affecting Ethiopia and Ethiopians today: education, elections, federalism, infrastructure, property rights and farmers. It claims to cover two objectives: to give a general overview of my observations and to link these observations to each of the aspects mentioned above.

15.2.1 Education

The DERG period

In 1975, Haile Selassie I University was renamed as Addis Ababa University. 'Zemecha' (a governmental campaign) contained the deployment of 60'000 students and teachers to rural areas to teach peasants of how to handle the forthcoming land reform, of how to improve agricultural production and the new political and social order. Private schools were nationalized and integrated into the national public school system. The number of primary schools grew from 3,196 in 1974/75 to 7,900 in 1985/86, a significant increase in all but three regions, including Eritrea and Tigray, where there was a decline because of continuing insurgencies. Primary school enrolments increased from about 957,300 in 1974/75 to nearly 2,450,000 in 1985/86. The number of teachers also increased. However, this increase did not keep pace with student enrolments. The student-teacher ratio went up from forty-four to one in 1975 to fifty-four to one in 1983 in primary schools and from thirty-five to one in 1975 to forty-four to one in 1983 in secondary schools. But there was still room for further progress. Only about 2.5 million (42 percent) of the 6 million primary school-age children were enrolled in school in 1985/86. Junior secondary school enrolments (grades seven and eight) amounted to 363,000, while at the secondary school level (grades nine to twelve), only 292,385 out of 5.5 million, or 5.3 percent, attended school. In addition, prospects for continued study for most primary school graduates were marginal. In 1985/86 there was only one junior secondary school for every eighth primary school and only one senior secondary school for every fourth junior secondary school. Space limitations at the colleges and universities caused the government to raise admission standards (Ofcancsky and LaVerle 1991). The government also introduced vocational training to upgrade peasant skills. The peasant training centers, operated by the Ministry of Agriculture, provided training in vocational trades related to agriculture for periods ranging from three weeks to six months. The country had twelve such centers, which trained more than 200,000 farmers from 1974 to 1988 (Ofcancsky and LaVerle 1991).

Under EPRDF

Improvements in the Education System have continued until today. The enrolment rate is still increasing and new universities all around the country have been built or are under construction. This should guarantee a more decentralised higher education. But

decentralised education does not automatically mean a step towards more equal education. Every Ethiopian allowed to study at university has to submit the fields he or she would like to make his or her Bachelor or Master. The final field is then defined by a responsible commission and the respective student has no influence on this decision. The government allocates students to certain fields, and the students concerned have no opportunity to freely decide on their career. Since the different study courses are linked to specialised universities around the country, studying away from home is verisimilar. The combination of fees that have to be paid for every credit point and the higher living costs for living out, higher education needs a certain income which has to be provided by the parents in most cases. There are examples where students have worked for a few years and thus could save money to finance their studies, but these cases are rather the exception than the rule today (personal communication with Ethiopian study tour participants). Finally, and not directly linked to the education system, but still an important issue: Most of Ethiopian families who can afford to send their children to university have at least one person with a job paid by the government. Incomes from private business are rare because of state controlled industries in almost every sector. On the other side, government jobs are almost the only ones (beside jobs in international organisations or (foreign) NGOs) offered to high skilled labour forces with an university degree, which indicates a high rate of self reproduction of the actual government dominated system, which includes most of the institutional framework (personal communication with Ethiopian study tour participants).

15.2.2 Elections

Ethiopia's legislature is bicameral. The Council of People's Representatives selects the Prime Minister, named Meles Zenawi, and it is the highest authority of the Federal Government, with the power of legislation in all matters assigned by the constitution. 548 seats are elected for a term of five years. The federal council is composed of 108 representatives who are elected by the state government councils for five years. The state councils may elect their representatives directly or hold elections. Usually, members of the council are also members of their federal state government. The Federal Council has the power to interpret the constitution and to protect the rights of the nationalities and people in Ethiopia. (Permanent Mission of Ethiopia 2002). For more details, please consult chapter 14 'Political dimension: historical and governance issues'.

Beck et al. (2000) judges political institutions with 'electoral rules' as one of seven measurement categories. According to Frey (2002), in political-economic theory free elections are a central issue in improving acceptance and trust in government decisions. Free elections lead to a better (not a perfect) representation of the composition of population in governmental councils and a better consideration of people's will in governmental decisions. Free elections lead to stronger incentives under politicians to act in the name of the population because of the pressure of re-election. For Ethiopia, independent NGO's represent another opinion than governmental voices represent. Freedom House (2006) writes:

'Ethiopians cannot change their government democratically. … executive power is vested in a Prime Minister, who is selected by the House of People's Representatives. The government has devolved some power to regional and local governments. The reality differs from what is constitutionally mandated, in practice seriously limiting the right of the people to select their government. … Previous elections resulted in allegations from opposition parties and civil society that serious irregularities had existed, including unequal access to media, biased election officials, lack of transparent procedures, a flawed election law, and a partisan National Electoral Board. The ruling EPRDF proclaimed the 2000 elections 'free and fair' and used its overwhelming victory to consolidate power. Regional elections in 2001 were marred by killings, candidate harassment, voter intimidation, and allegations of ballot box stuffing.'

Peter Takirambudde (2005) from Human Rights Watch writes:

'… Ethiopian authorities have established new institutions that suppress speech and political activity in the country's most populous region. [Oromia-Region] … Oromias regional government began imposing an entirely new set of quasi-governmental community development organizations called 'gott' and 'garee', in thousands of rural communities. While government officials claim that these institutions exist to facilitate development work, they are actually being used to monitor and control the speech, movement and personal associations of rural households in violation of fundamental rights.

Both stories, the one about repressions and arbitrary imprisonments without official reasons around the last election in 2005, as well as the one showing that the ruling of the Tigrinian Prime Minister is representing a minority of the people, indicate that the past elections cannot be referred to as 'free and fair' as proclaimed by the ruling government. (This conclusion should be interpreted cautiously and for more details, please refer to chapter 14 'Political dimension: historical and governance issues'.)

15.2.3 Federalism

According to the new constitution from 1994, a federal system was introduced in Ethiopia. Administrative divisions are nine ethnically based states (kilil), named Afar, Amhara, Binshangul, Gumuz, Gambela, Hareri, Oromia, Somali, Tigray, Southern Nations and two self-governing administrations (astedader) Addis Ababa and Dire Dawa.

Power was now shared between the centre and regional governments both being autonomous in certain clearly defined areas. The functions of both central and regional governments are constitutionally defined. Regional governments are administering their areas, the central government is responsible for foreign relations, defence, and general policies of common interests and benefit, such as public goods at national level. The official language is Amaharic (Permanent Mission of Ethiopia 2002).

Frey (2002) evaluates federalism from a political-economic perspective. He describes positive effects of a federal political system. Federalism creates positive incentives for an efficient allocation of resources because regional governments are in competition with others. This exemplary model assumes, that people are well informed and have the possibility to 'vote by feet'. This means that if they are not satisfied with the activities of the government of the federal states, they will turn to another government, to one of which they expect more understanding for their interests. This increases the pressure on these regional governments to act in the way people like them to and to amplify the use of resources in the interest of the people. It should be noted, that this model bases on a federal system as we have it in Switzerland, a historically grown one and not a system that has been introduced within ethnically based borders as in Ethiopia (see below). Furthermore, the possibility of 'voting by feet' is not very realistic, because the majority of all Ethiopians are farmers and has only little or no chance to move to other regions; they are economically bound to their piece of (arable) land and socially to their individual environment.

Beck et al. (2000) account 'federalism' as a second category (cp. 2.2) of indicators to evaluate political institutions. So, federalism could be taken as an institutional matter. At the same time, Easterley (2000) estimated the coherence between the quality of institutions and ethnic conflicts. He describes, that in countries with highly developed institutions, ethnic diversity does not significantly hurt policy choices. The other way around, this means that poor institutions and ethnic diversity heightens the risk of ethnical fractionalisation or even worse: wars and genocides. This does not mean that this is a realistic scenario for Ethiopia, but there seems to be a dangerous potential and it matches with voices among Ethiopians who report about a growing importance of the ethnical affiliation ever since these ethnically based federal states have been introduced.

15.2.4 Infrastructure

Infrastructure and services such as roads, rails, power, water and sanitation systems as well as communications are crucial institutions for growth, competitiveness, better health and education and poverty reduction. Such network utilities were state monopolies in most countries. But state-owned monopolies often perform poorly because of the failing to deliver quality or due to underinvestment. It is estimated that developing countries need to double (on average) their spending on infrastructure to at least 6-7 percent of Gross Domestic Product (GDP) over the next few years to meet infrastructure investment needs (World Bank 2004). It is not possible to get the exact data from Ethiopian government, how much they spend for infrastructure. The World Bank (2004) measured access to infrastructure on the basis of fixed line and mobile phone subscribers in the year 2002. In Ethiopia, as in most sub-Saharan countries, the rate is below 50 per thousand people, which is the worst result in the index for access to infrastructure. For comparison: in Western Europe and USA/Canada, more than 1000 subscribers per thousand people were registered, this means more than one per person! But results have to be interpreted cautious: Providing, for example, phone infrastructure (access through lines or antennas) is just one aspect. Another one is:

people need capital to finance phones and phone bills. This could also enforce such circumstances and has no direct connection to infrastructure provided by the government. In a country such as Ethiopia, where the majority of the population consists of small scale farmers living widespread in the country, both of these aspects are to be kept in mind: subsistence farmers do not have the resources either to buy phones or to pay phone bills and it needs big investments in infrastructure from the government to guarantee access countrywide. The same argumentation holds true for other infrastructural aspects. Access to drinking water or electricity needs investments several the times as done today, if the whole countryside should be connected to these nets. This is a governmental duty and needs both, the will and the resources of the government. Today, only parts of the major cities in Ethiopia have access to such net infrastructure. Another example widely discussed in economic literature is the impact of a well running transport system. Ethiopian Airlines belong to the best airlines around the world and names herself as the best one in Africa. Whether true or not, for most Ethiopians this statement is reality and means something to be proud of. However, to use this advantage for trade or travel around the country, it is too expensive and not a real option. So it could be concluded that in the near future, Ethiopian Airlines will not help to increase the trade volume or bring welfare to a broader part of the (rural) population. Railways are almost inexistent. There is an old railway line with connections from Addis Ababa to Djibouti, but the connecting passage between Addis Ababa and Dire Dawa is not in use anymore these days. So, most of international trade, which is export via the port of Djibouti, uses the road from Addis Ababa, where all major roads of the country come together, to Djibouti. This road is one of the best developed ones in Ethiopia and it is mainly used for international trade. In economic literature, there is a strong correlation between well functioning transport infrastructure and economic performance. The Ethiopian example cannot clearly attest this. Even on the few existing roads all around the country (for exact data, see chapter 4 'Urbanisation and transport network') there is only little trade and individual transport. Just a few public busses connect major cities daily and almost no public transport exists beyond these main roads. The same holds for trade. Reasons could be no capacities among the major parts of the population, who are subsistence farmers, high transport costs because of roads in partial bad conditions or high fuel prices in combination with long distances. This instance matches with the following observation: A new road in very good condition between Bahir Dar and Gonder is just rarely used for both public transport and trade. There seems to be just a little capacity for national trade even between major cities. On the other hand, there is a lot more traffic between Harar and Dire Dawa on a similar road and according to Ethiopians living in this region, the possibility of exporting 'chat' is widely used and helps the local chat farmers to have an income above the national average. Also individual traffic seemed to be higher than in other parts of the country, and this could be an indicator for a higher average welfare level: more people can and do afford travelling between cities and villages along this road. There is a direct connection to the road to Djibouti or even more, it is a part of it, and a shorter distance for export goods (this leads to lower transportation costs) could be an evidence for this transport-infrastructure argument and is a possible field of possible further estimation.

15.2.5 Property rights

Keefer and Knack (1995) measured the impact of property rights on economic growth. Data is collected from two private international investment risk services which provide detailed ratings for large samples on dimensions of property rights: the International Country Risk Guide (ICRG) and the Business Environmental Risk Intelligence (BERI). The ICRG contains the following indicators: quality of bureaucracy, corruption in government, rule of law, expropriation risk and repudiation of contracts by government. BERI contains bureaucratic delays, nationalization potential, contract enforceability and infrastructure quality. In their estimation, the institutional indices are statistically significant in every case and show economic impacts. Institutions that protect property rights are crucial to economic growth and to investment and it is suggested that the security of property rights affects not only the magnitude of investment, but also the efficiency with which inputs are allocated.

It is important that property rights are guaranteed on the one hand, but on the other hand it is also very important that law protects equal property rights for every person. Regarding contract enforcement, they wrote:

'In the absence of state enforcement or in regimes in which officials have the power unilaterally to modify or to repudiate contractual agreements, the only impersonal exchanges taking place between private economic actors will be those that are 'self-enforcing' – those which the benefits of compliance exceed the gains from cheating or reneging. This restriction on economic activity severely limits the universe of possible Pareto-improving exchanges that would otherwise be undertaken' (Keefer and Knack, 1995: 211).

In general, this means that only transactions would be done with legal benefits bigger than benefits for the stronger party by cheating. Protection of property rights through law could be seen as incentive to act towards the social optimum while following own interests because only transactions beneficial to both contract parties would be closed. At the same time there are fewer possibilities for the stronger party to enforce own interests at the expense of the weaker contract-party. Secure property rights mean also freedom from expropriation and the possibility to use the own property as a guarantee for further investments, e.g. a credit.

According to property rights in Ethiopia, the situation in agriculture is taken as example. Ethiopian farmers do not own the land they work on. From an economic perspective, this means no incentives towards sustainable land management or further investments in treating the private agricultural land. Dangers of expropriation or redistribution as it happened several times in the last decades would have similar effects on investments on the own land: only investments would be undertaken which bring benefits, even in an imminent situation of expropriation. This leads to ambitions for short term benefits and long term benefits like benefits due to sustainable land management would be less important and less realized. Banks will refuse credit applications because farmers generally cannot provide any guarantees. Farmers

normally cannot sell their land in order to start a new business, even if they have a promising concept at hand. And thus the redistribution from subsistence farming to second and third sector employment is rather slow. But exactly this redistribution should be made possible in the next years because the average farm size is already too small to be divided any further and, at the same time, the population is growing by more than 3 percent every year (Ofcansky and LaVerle 1991). It should be noted that a radical privatisation from government owned farmland could bring a lot of new problems about. People need to be accustomed to handle private land and to handle the new possibilities in a sustainable way.

15.2.6 Farmers

The situation of farmers has little influence on literature about institutions and economic growth. But to judge countries with a big share of farming people among the total population, a focus on farmers and on one could enhance their situation seems important, e.g. in the case of Ethiopia with more than 80 percent farmers (see preceding chapters). Enhancing the situation of the farming population means enhancing the situation of the country and vice versa. According to the World Bank (2004), agricultural production increased by an average annual rate of 2.l percent between l965 and 1973, while population increased by an average annual rate of 2.6 percent during the same period, this means a decline in real terms!

Agricultural productivity under the Derg continued to decline. The poor performance of agriculture was related to several institutional factors: a government policy of controlling prices, the unstable political climate, the dislocation of the rural community caused by resettlement, conscription of young farmers to meet military obligations; land tenure difficulties and the problem of land fragmentation; the lack of resources such as farm equipment, better seeds, and fertilisers; and the overall low level of technology. President Mengistu's 1990 decision to allow free movement of goods, to lift price controls, and to provide farmers with security of tenure was designed to reverse the decline in Ethiopia's agricultural sector. There was much debate as to whether or not these reforms were genuine and how effectively they could be implemented. Nonetheless, agricultural output rose by an estimated 3 percent in 1990-91, almost certainly in response to the relaxation of government regulation (Ofcansky and LaVerle 1991). Accounting for over 40 percent of GDP, 80 percent of exports, and 80 percent of the labour force, agriculture remained in 1991 the economy's most important sector. Ethiopia has a great agricultural potential because of its vast areas of fertile land, diverse climate, generally adequate rainfall, and a large labour pool. Despite this potential, Ethiopian agriculture has still remained underdeveloped (Ofcansky and LaVerle 1991). Today, agriculture is still the biggest economic sector and it affects the majority of the Ethiopian working population. Two main needs in this sector could be seen: First, improvements in terms of productivity are necessary to provide enough food for the growing population both in the short and the long term. In this context, the government plays a key role: providing infrastructure (e.g. water supply to enhance production and productivity) and give land into property of farmers to reduce problems related to security of tenure (today, farmers are still reluctant to

improve their land because they are afraid that they would not receive adequate compensation for sustainable land management and other investments. The danger of a new redistribution of land and a loss of benefits connected to such upgrades seem to be too high). Second, a strategy seems to be crucial, to create more jobs in the 2nd and 3rd sector, to solve the problems of pressure on land and create a growing purchasing power. The area of arable land can't grow as much as the population seems to, so other strategies than subsistence farming are needed.

15.3 Conclusion

An improvement in some institutional areas is crucial. The question is where to start and the answer is hard to find. Since the majority of Ethiopians still remain in the agricultural sector, I would suggest starting programs supporting farming people. A stepwise introduction of property rights could create a more sustainable incentive structure with regard to the treatment of the arable land and economic activities around. If farmers are instructed in this self-thinking direction, I expect more initiative based on own ideas at the individual and the community level. To reach this target, equality of educational opportunity is important, and this calls for more schools and universities. Furthermore, it also needs more job possibilities in the 2nd and 3rd sector, and this cannot be guaranteed by the state alone. Improvements in infrastructure could help to improve possibilities for economic activities. Therefore, the Ethiopian government money is needed. I can see a huge potential in this country to get this money, the question is if there is a will to materialize these potentials and to invest the money for the benefit of the country. Ethiopia as the 'homeland' of the gluten free teff today has an advantage in growing this crop and I can see a export potential which will bring benefits to farmers (higher prices for teff in the world market than in the national market) as well as to the government (higher income possibilities through tariffs). Another potential could be seen in hydro power plants. Ethiopia with a huge amount of annual rainfall could act as an exporter of hydro energy, which is a long term potential: fossil fuel is getting shorter and demand for electric energy is growing. On the other side, on the level of individuals, incentives for sustainable land management and self improvements should be set, e.g. through property rights on the land for farmers, introduced stepwise, functioning infrastructure and possibilities for private economic activities beside governmental activities. The state should provide goods which the private sector doesn't provide and give an institutional framework which leads the private sector to benefits for the country. Finally, Ethiopians should not let all competences rest in the hands of the government or of foreign aid, even if I can understand such a mindset in the historical context. However, in my opinion, the risk is too high that such a strategy could fail, as it has happened several times in the last decades. A lot of energy is needed to fight for improvements, even in a very small range of possibilities, while the government controls all of the major branches of the economy. For the case that, one day, the situation will change for the better, the Ethopians should be ready. Just waiting and start thinking when the situation has already changed, brings another delay of several years or even worse, generations. This

would be my wish for this country, for the wonderful people and most of all for my new Ethiopian friends.

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Part IV – Special themes along the study tour

16 Stations of the Soil Conservation Research Programme (SCRP) in Ethiopia

Compiled by Karl Herweg, Hans Hurni and Brigitte Portner

The following components of Chapter 16 have been taken from SCRP Reports (SCRP 2000a-d)

Problem-oriented soil conservation research

From its inception in 1981, the Soil Conservation Research Programme (SCRP) in Ethiopia was mainly problem-oriented. By that time, the World Food Programme (WFP) had already been operating a massive soil conservation campaign for several years. But many SWC technologies were applied too rigidly in this campaign. The need to assess their efficiency and elaborate possibilities for improvement were major reasons why the Ethiopian Government invited the Swiss Agency for Development and Co-operation to help establish a research network through the University of Berne. The main objective of the SCRP was to support soil conservation efforts in Ethiopia by monitoring soil erosion and relevant factors of influence, by developing appropriate soil and water conservation measures, and by building local and international capacity in this field of research. It was stated at an early stage that "the SCRP should confine itself to the evaluation of data most urgently needed, whereas a wider and more detailed investigation should be aimed at in the future" (Hurni 1982).

Ultimately, the target group of soil conservation information were land users. But the direct user groups of SCRP research results, its database and its publications today are:

- Soil conservation experts, planners and decision-makers at the regional / national level. They prepare the general framework for a more sustainable land management by improving land policies, allocating extension services appropriately, carefully using incentives, improving training and education, etc.
- Agricultural extension services and development agents at the local or community level who support land users in their efforts to develop appropriate land management practices.
- Researchers who contribute to solving various problems faced by other user groups.

From the beginning of the programme in 1981, the SCRP attempted to respond to needs felt at the time, for example to develop soil and water conservation (SWC)

technologies that are technically feasible, ecologically sound, economically viable and socially acceptable. Today it is clear that research on its own could not elaborate truly innovative solutions for the overwhelming problems of land degradation in the highlands. This calls for a strong collaboration of researchers, extension services and, last but not least, the land users themselves. Now it is also understood that best results could only be achieved through an iterative process of participatory technology development (PTD) from the stage of designing to the stages of implementing, monitoring and improving SWC measures. For many reasons, it was not always possible to guarantee this form of co-operation; such a task still remains a challenge to be met today. Thus, the SCRP alone was certainly not in a position to come up with the standard solution to stop soil degradation in the highlands. But those involved in the programme gained considerable methodological experience and produced a wealth of data that were, and are still being used by Ethiopian researchers, consultants, experts, planners and decision-makers, providing substantial information for their specific tasks on the difficult path towards more sustainable land management.

Data generated by the SCRP since 1981 encompass a wealth of information, of which only a fraction has been utilised so far. The SCRP data probably form one of the most extensive and comprehensive databases in Sub-Saharan Africa to date. It is hoped that many more researchers and experts will make use of it, and that it will also provide the starting point for efforts to formulate and conduct complementary programmes in the future.

Concept and methodology of the SCRP

The research concept of the SCRP was described in detail by Hurni (1982), Grunder (1988), Hurni (1989 and 1994), Herweg and Grunder (1991), and Herweg and Hurni (1993). It involved the selection of benchmark sites with various socio-cultural settings in several different agro-climatic zones of the country. Accordingly, test catchments (small watersheds) with traditional land use systems and a size between one and seven km^2 were chosen. Soil erosion and other related variables were monitored in these catchments. The sites were observed without SWC for a period of one or more years, as well as for several years after SWC measures had been implemented by the WFP. The SCRP benchmark sites (Figure 16-1) were selected in Maybar / Wello (1981), Hunde Lafto / Harerge (1982), Andit Tid / Shewa (1982), Anjeni / Gojam (1984), Afdeyu / Eritrea (1984), and Dizi / Illubabor; another site was taken over from the Wolayta Agricultural Development Unit (WADU) in Gununo / Wolayta (1982).

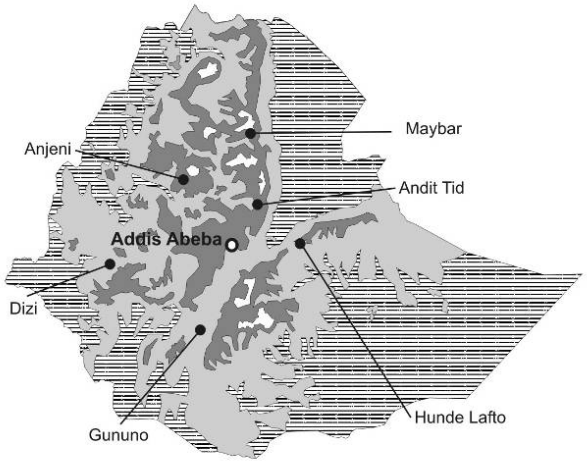
The research programme was implemented with as little disturbance of the catchments and the farmers' fields as possible; all experiments were on-farm instead of on-station. The programme mainly monitored runoff / river discharge and soil loss / sediment yield at different scales, on different slopes and soils, under various land uses and crops, and under several SWC treatments. Parallelly, climatic data such as the amount, erosivity, intensity, inclination and direction of rainfall, air and soil surface temperature, wind direction, evaporation and duration of sunshine were recorded to interpret the erosion measurements. Land use was mapped for each cropping season. Throughout the

catchment, crop yield and biomass samples were collected to monitor production of the major crops. The general status of soil degradation was determined through soil surveys. Current soil erosion was measured on test plots and at the hydrometric station, where hundreds of events were recorded over the years on each site. This allowed to determine the average patterns of soil erosion, for example by calculating mean annual and monthly results. Extreme patterns of erosion were determined by analysing the impact of the most severe rainstorms (critical times), and by mapping erosion rills at critical locations right after such extreme erosion periods (Figure 16-2).

In addition to the standard programme described above, the SCRP responded to site-specific research needs with a supplementary programme. Population and livestock dynamics, household land management strategies, attitudes towards and perceptions of SWC, as well as reactions to policy changes were documented specifically. BSc, MSc, PhD and short-term studies covered other relevant topics, such as agronomic SWC measures, indigenous SWC measures and strategies, soil fertility, erosion modelling, environmental education, and many more. The SCRP used a programme hierarchy with different research levels (Figure 16-3). At levels 3, 4 and 5 data were collected exclusively by the SCRP itself within the seven research catchments and their surroundings. At levels 1 and 2 SCRP data were combined with information from other sources, such as the Ethiopian mapping, meteorological or land use planning authorities.

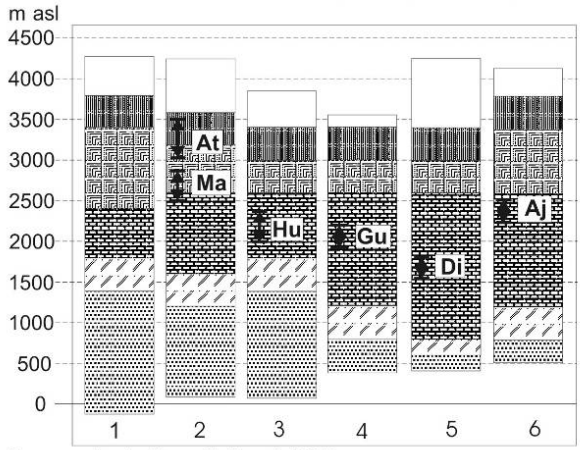
Outputs at the national and regional / zonal levels (levels 1 and 2) are e.g. an agro-ecological belt map at a scale of 1:1,000,000 and a study of rainfall erosivity. Climatic, land use/land cover, geomorphological, erosion, and demographic information are provided in a digital form as part of a Geographical Information System (GIS).

- Outputs at the intermediate / community level (level 3) are e.g. topographic maps, soil maps, and demographic data. More detailed surveys were conducted to assess peasants' perceptions of the environment, to study their response to environmental problems, and to determine social, economic, cultural and political limitations to SWC.
- At the catchment level (level 4), the SCRP monitored river discharge and sediment yield as well as land use, different parameters of vegetation, and production. Spatial patterns and immediate causes of soil erosion were documented after several erosive rainstorms (assessment of current erosion damage: ACED).
- Climatic data are recorded at the plot / experiment / household level (level 5). The impact on soil erosion and production of land use, vegetation, slope gradient, soils, SWC measures and various agronomic parameters was measured on test plots, micro-plots and experimental plots. Socio-economic aspects such as land users' SWC strategies and the range of technical options available to them were investigated at the household level.



0 - 1000 m asl
1'000 - 2000 m asl
2'000 - 3000 m asl
> 3000 m asl
SCRP research stations

Variation in the altitudinal range of agroecological belts



Source: adapted from H. Hurni, 1995

Research stations:

Aj	Anjeni (2407 - 2507 m asl)
At	Andit Tid (3040 - 3548 m asl)
Di	Dizi (1565 - 1789 m asl)
Gu	Gununo (1982 - 2103 m asl)
Hu	Hunde Lafto (1963 - 2315 m asl)
Ma	Maybar (2530 - 2858 m asl)

Agroclimatic rainfall regions:

1 Northeastern, unimodal
2 Central eastern, bimodal
3 Southeastern, bimodal
4 Southwestern, bimodal
5 Western, uni- to bimodal
6 Northwestern, unimodal

Agroecological belts determined by rainfed crops

Altitudinal belts		Major crops	
I	***Wurch:***	No cultivation	
			Upper limit of barley and (rarely) potato cultivation (due to temperature)
II	***High Dega:***	Barley (potato)	
			Upper limit of wheat/pulses (due to temperature)
III	***Dega:***	Wheat, barley, pulses	
			Upper limit of maize/tef (due to temperature)
IV	***Weyna Dega:***	Tef, maize, wheat, pulses	
			Approximate lower limit of maize/tef (due to rainfall)
V	***Kolla:***	Sorghum, tef (rarley)	
			Approximate lower limit of sorghum (due to rainfall)
VI	***Berha:***	No rainfed cultivation	

Figure 16-1: The benchmark sites of the Soil Conservation Research Programme (SCRP)

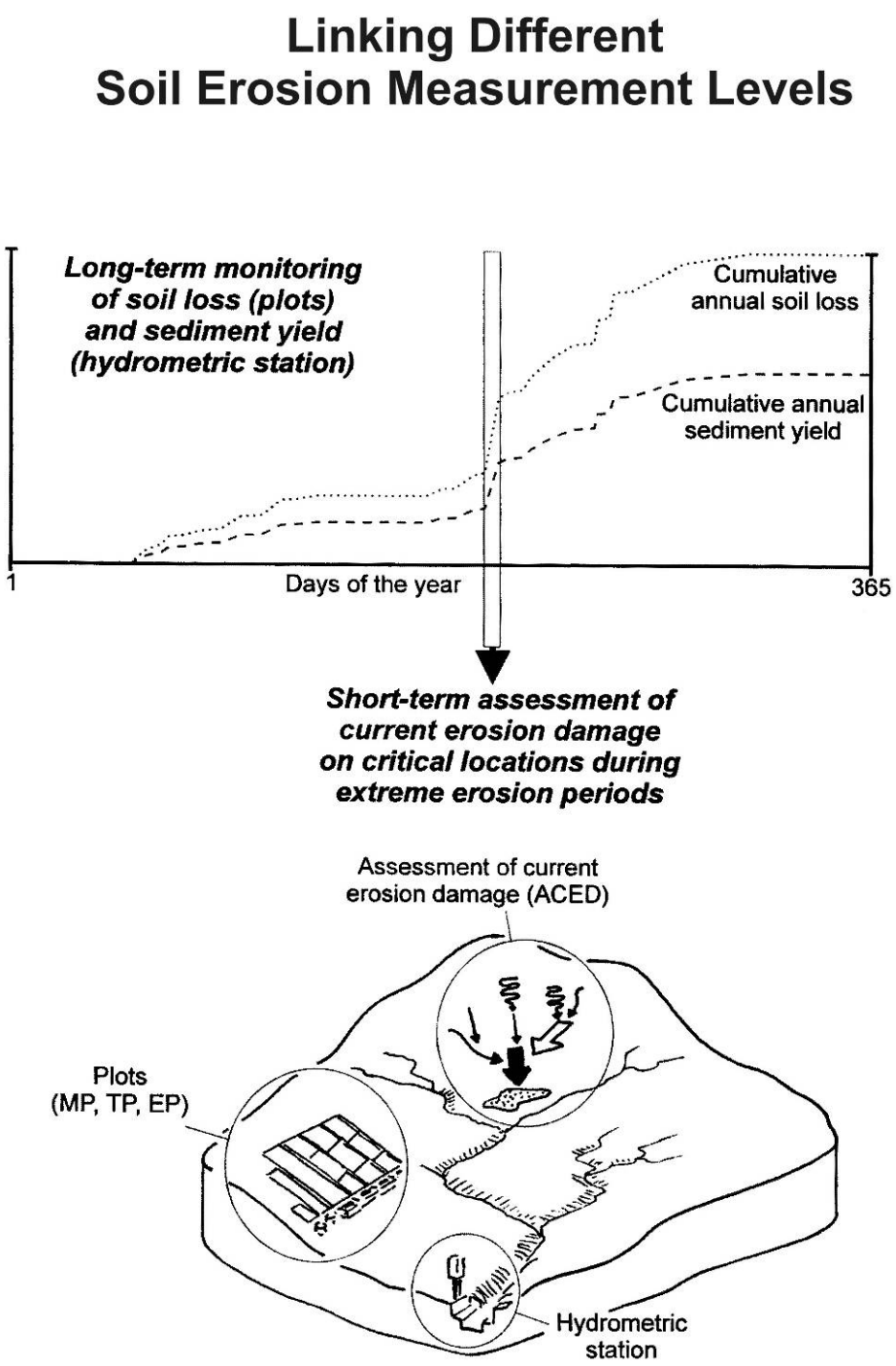


Figure 16-2: Integrating different soil erosion measurements (Herweg and Stillhardt 1999)

The permanent adaptation of the research programme

Responding to changing biophysical and socio-economic settings - and consequently to changing research needs - the SCRP made several innovative adaptations of its approach and methodology since 1981. Such were, for example:

Responding to famine

The famine in major parts of the country in 1984/85 initiated systems research studies in order to understand the causes and consequences of famine (Hurni 1993). Particular attention was given to study traditional mechanisms of dealing with drought situations, and to determine the role of the soil degradation status in drought-prone areas. Apart from action-oriented programme components, such as development of irrigation near the test areas in Wello and Eritrea, consultations were carried out for international relief organisations. Based on field data and models, scenarios of how the famine developed were produced.

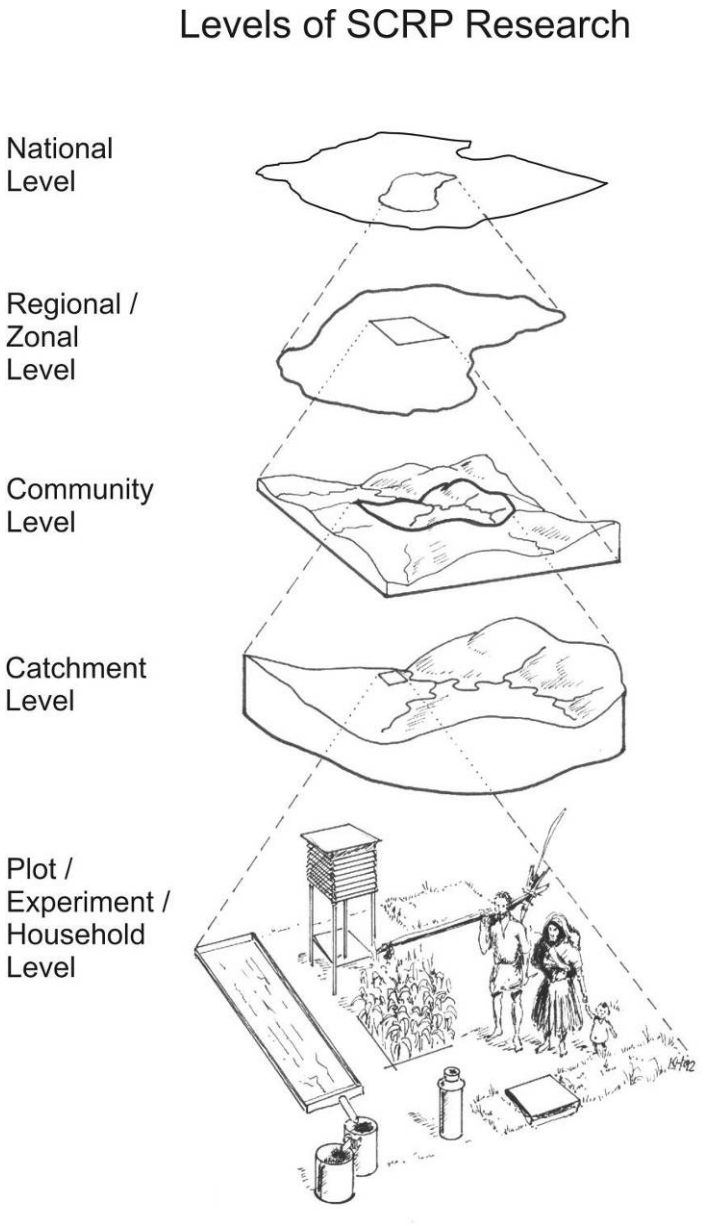


Figure 16-3: SCRP research levels (Herweg and Hurni 1993)

Searching for alternative incentives

In Anjeni research station in Gojam, an alternative SWC approach was introduced. Instead of receiving food for (conservation) work, farmers were encouraged to carry out conservation work in exchange for infrastructural support. A clinic was built, as this was the highest among their development priorities.

Considering the production aspect of SWC

The impact of soil erosion and SWC on the productivity of the soils was analysed investigating the soil depth / production relation (Belay Tegene 1992). This study allowed to clearly trace the long-term effects of soil degradation. Similarly, a cost / benefit assessment (Ludi 1994) revealed that on steep slopes, soil conservation only pays after a period of about 30 years, i.e. way beyond the planning perspective of both farmers and the administration.

Introducing digital technology: the GIS

In view of a wider application of data and information from both the SCRP and other sources, a Geographical Information System (GIS) was introduced in 1988. A digital terrain model based on 200 m contour lines was systematically developed and now allows to model soil erosion and the relative importance of soil degradation and declining agricultural production in the highlands (Hurni 1993). Of course, such models and scenarios must permanently be upgraded (Gete Zeleke 2000).

Responding to political change

During the 1991 political transformations, farmers all over the country reacted in many ways, for example by "removing" SWC structures introduced by the WFP. There is an on-going debate whether this should be considered a form of destruction or of adaptation of SWC measures. The reaction of farmers led the SCRP to give more emphasis to research on biological and agronomic SWC, in order to improve the production aspect of conservation (Kassaye Goshu 1994). As a result of this new orientation, the SCRP also responded by promoting more detailed socio-economic research (Tsehai Berhane Selasse 1994; Yohannes G/Michael 2000).

Harmonising introduced and indigenous SWC

A first survey of indigenous SWC was carried out throughout the country as early as 1983 (Hurni 1984). It served as a basis for designing innovative technologies; existing technologies were taken into account and their ecological efficiency (runoff and soil loss control) was improved. But the debate about the usefulness of both indigenous and introduced SWC measures did not stop there. More detailed studies on indigenous SWC measures followed (Million Alemayehu 1992; Krüger et al. 1997; Yohannes G/Michael 2000). Starting from 1984, introduced SWC measures were tested on large (experimental) plots (180 m^2). These experiments allowed a comparison of different measures and offered an interesting insight into their impact on soil erosion and production. Eventually, the results began to shed some light on the detrimental effects of SWC (Herweg and Ludi 1999); this led to further modifications of the research programme. In Anjeni, a pilot trial was introduced to test integrated SWC aiming to

enhance production as well as to control erosion. The design of this trial involved a fairly long process of negotiation between researchers and farmers.

These examples highlight the evolutionary character of the SCRP methodology. Flexibility was also built into the planning process, where the main Ethiopian institutions concerned with research and soil conservation were involved. The SCRP always tried to follow a dual strategy. On the one hand, it maintained a standard programme in order to obtain long-term data series to understand the long-term character of soil erosion, soil conservation, and their impacts. On the other hand, its supplementary programme introduced the necessary flexibility to take into account additional and site-specific research needs.

An evaluation of major achievements and constraints in 1998

Based on two external evaluations of the SCRP in 1993 and 1998, the following statements can be made:

- The SCRP has compiled a wealth of first-hand data on the above-mentioned topics; this is unique in the African context. However, as yet it has only been possible to analyse and synthesise the basic data, for example on an annual, seasonal and monthly basis. Much more needs to be done, since the investigation of data on single rainstorm periods has only just begun (Herweg and Stillhardt 1999). In addition, the application of data to wider areas and the prediction of the potential performance of SWC measures (before implementation) requires an appropriate soil erosion model. In this context, the Water Erosion Prediction Project (WEPP) showed first promising results (Gete Zeleke 2000); however, it needs to be developed further.
- The use of research findings for practical application was prepared in many ways. Results and interpretations were compiled for the Ethiopian extension services in the form of field manuals on: soil conservation (Hurni 1986b), erosion damage assessment (Herweg 1996), photo-monitoring (Bosshart 1997), participatory technology development (Yohannes and Herweg 2000). A video was produced to address the wider public. A school book (Shibru and Moll 1993) and teaching aids for high school teachers (Mulugeta 1995; Mulugeta et al. 1995) were produced to develop future generations' awareness of environmental issues. The use of some of these products now needs to be supported by regular training and updating. These educational products are only a few of the many possible practical applications of the research results.
- Because of the tremendous soil loss rates measured and the fact that biological SWC has a rather low impact at the beginning of the rainy seasons, the SCRP focused on physical (mechanical) SWC measures. Although experiments with agronomic and biological measures were initiated as early as 1985, and although the 1991 shift of emphasis in research tried to give more weight to such measures, it was not possible to cover this topic sufficiently. Unlike physical measures that can be tested with standard experiments throughout all agro-climatic zones, biological SWC research differs considerably from site to site. The SCRP trained many researchers in order to fulfil SCRP research needs. But

many of them left, responding to an increasing demand of the University and NGOs for trained personnel, so that not all of the SCRP's own objectives could be met with the remaining staff.

- The same holds true for research on the socio-economic aspects of SWC at the local level of the benchmark sites, which also requires a highly site-specific approach and methodology. Beyond that, the SCRP was not given the mandate to adequately address the political and economic framework for SWC at the national and regional levels, i.e. such aspects as SWC legislation, incentives and subsidies, land security, and other highly important issues.
- The decentralisation of the SCRP after 1996 brought about more responsibility of the regions, but the SCRP still lacks full integration into Government structures, as well as formal linkages to other institutions for research, extension and education.

16.1 Andit Tid in North Shewa

The Andit Tid catchment is located in Amhara region 180 km ENE of Addis Abeba at 39°43' E, 9°48' N. It comprises of 477.3 ha of hydrological catchment with an altitudinal range from 3040-3548 m asl.

Station Overview

Location	39°43'E / 9°48'N. Region: Shewa; 180 ENE of Addis Abeba
Altitudinal range	3,040 – 3,548 m asl
Catchment size	Hydrological catchment: 477.3 ha; Topographical catchment: 477.5 ha
Climate	According to Thornthwaite: humid Mean annual temperature: 12.6 °C Mean annual rainfall: 1417 mm Length of growing period: 175 days
Geology	Volcanic rocks: rhyolites, trachites, tuffs and basalts
Soils	Humic and ochric Andosols, Fluvisols, Regosols and Lithosols
Soil degradation status	High degradation status, specially in the lower part of the catchment. Soil fertility is limited through low pH and N- and P- deficiency
Agro-ecological classification	*Wet Dega / Wet high Dega*
Farming system	Smallholder mixed farming system with grain oriented production (barley), ox-plough farming with uncontrolled grazing practices
Main crops	Barley
Climax vegetation	Lower parts of the catchment: Coniferous highland forest with Juniperus procera and Podocarpus gracilior, higher parts of the catchment: Erica arborea (original potential)
Population density (catchment)	146 inhabitants per km^2 in 1986

Mean size of landholdings	(catchment) 1986: 41% of the households: less than 2 ha; 55% of the households: 2 - 5 ha 4% of the households: more than 5 ha
Livestock holdings (catchment)	1983: 17.8 animals per household, in 1995: 15.4 animals, thereof 64% sheep and goats
Station established in	July 1982

Climate and agro-ecological classification

Andit Tid is found in the Wet Dega and Wet High Dega agro-climatic zones. According to Thornthwaite it is classified as humid with mean annual temperature of 12.6° C, mean annual rainfall of 1,417 mm and a growing period of 175 days. A bimodal type of rainfall regime characterises the area with one dryer month (June) between *Belg and Kremt (*Figure 16-5). During four months (May and July to September) mean monthly rainfall exceeds 100mm. The months from November to February show arid conditions. The index of aridity for these months is below 20 (SCRP 2000). In the standardized climatic diagram, the rainfall graph drops below the temperature graph.

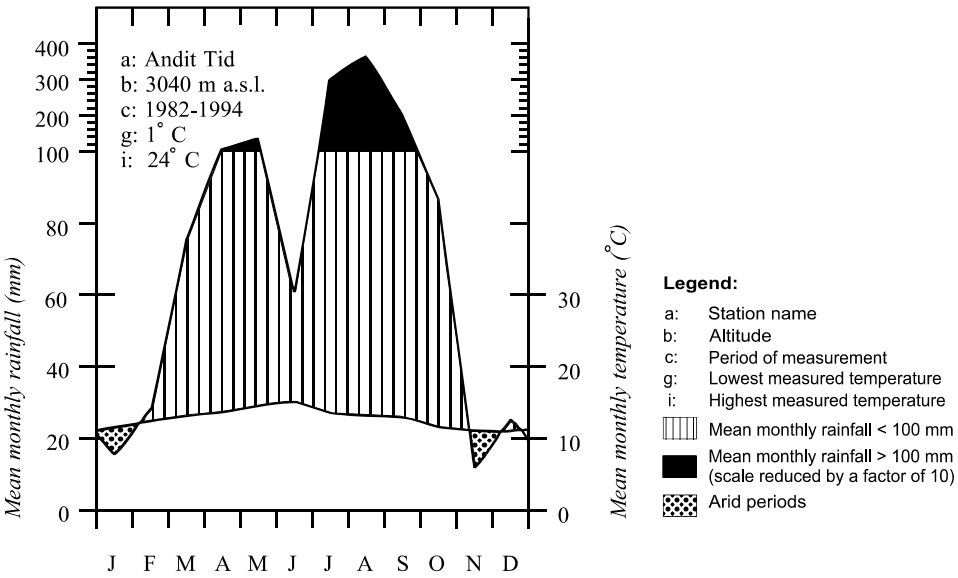


Figure 16-4: Climate diagram for Andit Tid at 3040 m asl

Geology and soils

The eastern part of the catchment includes the escarpment that separates the watersheds of the Abay and the Awash river basins. The area can be considered as an inclined plain with its highest peak in the southeast (3,560 m asl.) and its lowest elevations in the northwest (3,040 m) and southwest (3,060 m) respectively. It is divided into four valleys running from southwest to southeast. Most of its watercourses are perennial with variation in run-off volumes according to the annual rainfall, which is concentrated in the two rainy seasons. A few springs are found in the catchment with variable yield of water. The geology of the area is characterised by volcanic rocks

(most of them acidic) of the Magdala group (upper Miocene-Pleistocene) with rhyolites, trachytes, rhyolitic and trachytic tuffs and basalts. The local petrography is highly variable within short distances.

The most important soils in terms of extent and quality are Andosols occurring either as Humic or Ochric. Both are found between approximately 3,000 and 3,550 m asl. but it seems that the Humic Andosols occur in slightly higher positions and on steeper slopes. On top of ridges and on very steep slopes, these soils are shallow and contain high volume of stones (stony phase). Ochric Andosols have most probably developed through intensive cultivation for agricultural use coupled with soil erosion that removed the organic matter content of the topsoil from Humic Andosols. The occurrence of Ochric Andosols on gentler slopes suggests that these areas were the first ones to be cultivated for crop production, and that these soils, through repeated tillage practices slowly degraded from humic into ochric. Except for available phosphorous both soils exhibit high nutrient reserve and better water holding capacity.

The Ochric Andosols have relatively higher clay content, higher pH (5.2-6.2) as compared to Humic Andosols (4.9-5.8) and are usually less productive because their organic matter content is much lower. In some of the Humic Andosols the highest content of organic matter found was 19.6 percent but in general the content was twice as high as that found in the Ochric Andosols. The physical and chemical properties of these soils provide good conditions for crop production. The valley bottomland units are covered by Fluvisols that had developed through the accumulation and deposition of eroded soil material from the surrounding areas. Soil depth on relatively flatter slopes can reach more than two meters. The physiochemical properties of these soils are influenced by their origin from the surrounding area. Despite smaller pore volume as compared to the Andosols, the Fluvisols have a higher water holding capacity. The organic matter content of the topsoil is lower than the in most Andosols but increases slightly with depth. This confirms that these Fluvisols have been developed from the depositional material originating from up-slope eroding soils. Nutrient content is relatively good but deficient in available phosphorus.

Lithosols occur on steep slopes and as a result of continued soil erosion, have a high surface stone cover thereby limiting plowing by oxen. The water holding capacity is about 60-80 mm, a mean pH level of 5.9 and a mean organic matter content of 4.9 percent. The available phosphorus level is relatively higher in the Lithosols as compared to the other soils. Regosols are strongly influenced by erosion and accumulation and the profiles are usually not deeper than 50-60 cm. where the underlying rock is weathered making tillage practices possible even on the shallowest soils. These soils have the lowest organic matter content (in general <1%), are slightly acidic and the amount of plant available water is very low owing to the shallower depth. The available K^+, exchangeable Mg^{++} and available phosphorus are remarkably low.

In the lower and most western parts of the catchment Regosolic Cambisols can reach to a depth of 80 cm. They developed from accumulations from landslides and materials

eroded from the Andosols. Plant available nutrient content is higher with slightly acidic pH. Deep gullies are found on almost all steep slopes especially in the lower parts of the catchment. This is a consequence of climatic conditions, properties of the soils and more importantly to human activities that have been degrading the land resources for centuries.

Farming systems and socioeconomic setting

The farming system of the Andit Tid area is characterised by small-scale subsistence crop-livestock mixed production where the major crops are barley, wheat, peas, beans, linseed and lentils cultivated with ox-drawn implements. Sheep, goats, cattle, horses, donkeys and chicken are reared in an open uncontrolled grazing system. The natural vegetation is highly degraded but remnant trees of *Juniperus procera* and *Podocarpus gracilior* are observed at the lower parts of the catchment whereas *Erica arborea* are dominantly occurring on higher altitudes of the catchment. Currently *Eucalyptus globlus* is being planted as a reforestation program in gullies, along riverbanks, on private and communal lands.

Because of the high risk of frost during the *Belg* season, barley is cultivated as the staple crop in the upper part of the landscape. During the *Kremt* season mainly the lower parts are cultivated, leaving the *Belg* fields fallow for a long period of time, which later on are burned as part of the land management system for the area called *guie*. Depending on the area, cultivation seems to have started 530 to 1140 years ago (SCRP 2000). The present population is entirely Amhara practicing the Orthodox Christian faith. The land reform of 1975 brought new land redistribution where each household was allocated land for cultivation. Since then land holdings have been reallocated and split up due to the growing number of families entitled to land. This fragmentation of land is alleged to have caused a sense of insecurity for investment on land (Bekele and Holden, 1998, 1996) in previous times but the recent introduction of land registration, titling and certification in the country will create a sense of security on the land holdings for investment. According to Yohannes G/Michael (1989, 2000) the land holding varied dependent on the wealth of the individuals. However, the average holding were about 2.95 ha per household where 41 percent of the households owned less than 2 ha, 55 percent had 2-5 ha and only four percent had larger holdings.

Livestock play important role in the farming system by providing traction, transport and as a source of cash. Sheep are the dominant species constituting 55percent of the animals followed by cattle (19 percent) and goats (12 percent). The remaining constitutes the equines. Currently 26.5 percent, 15.3 percent and 56.5 percent of the smallholder farmers in the catchment own 0,1 and 2 oxen respectively. Crop residue is used as animal fodder. Oxen are used for traction whereas sheep and goats are sold for cash to complement household consumption and crop production activities. Animal manure is used for maintaining soil fertility and as a source of fuel. No commercial fertiliser is used as an external input to enhance soil fertility and improve yield of crops.

Runoff and soil erosion

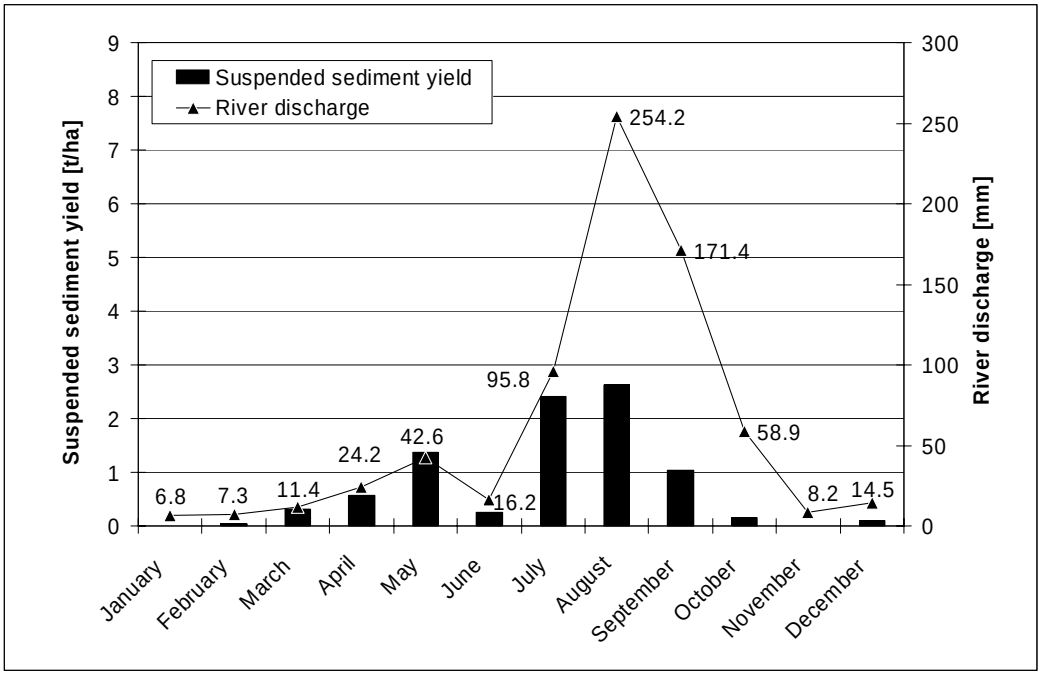


Figure 16-5: Mean monthly catchment discharge and suspended sediment yield (July 1982 – end of 1993) (Bosshart 1999)

Soil and water conservation

Andit Tid Research Station was set up in July 1982 as the fourth SCRP research site. Situated in the North Shewa Highlands in Central Ethiopia, the catchment lies at a high altitude, i.e. above 3,000 metres asl, and near the Eastern escarpment. The predominant temperatures and winds limit the number of crops; barley is a main crop in the upper part of the catchment. Land degradation is widespread and threatens to increase because of the steep topography. Much of the catchment area is actually not suitable for crop cultivation. Soil conservation was introduced in the catchment through a Food-for-Work campaign conducted by the Ministry of Agriculture from December 1983 to February 1984, at the onset of drought in Ethiopia. *Fanya Juu*, a new type of conservation technique originating from Kenya, i.e. literally 'throw uphill' structures made of soil and stone bunds, was introduced by SCRP for the first time in Ethiopia. Due to the high rainfall regime, the *Fanya Juu* had to be graded in order to collect surplus runoff and direct it to waterways. These measures had mixed results because the drainage ditches at the foot of the structures filled up fairly quickly due to trampling, or silted up during storms. Farmers then superimposed their indigenous drainage ditches on the *Fanya Juu* bunds, thus finding a way to slow down runoff and retain soil while draining surplus water. Since then, some of the terraces have been adapted, gradually increased and stabilised over the years, while others have been abandoned, i.e. simply ploughed over. Part of the catchment has been reforested over the years with Eucalyptus trees, as timber has become a source of economic opportunity, enhanced by the vicinity of the main road to Addis Abeba, which is only 180 kilometres away.

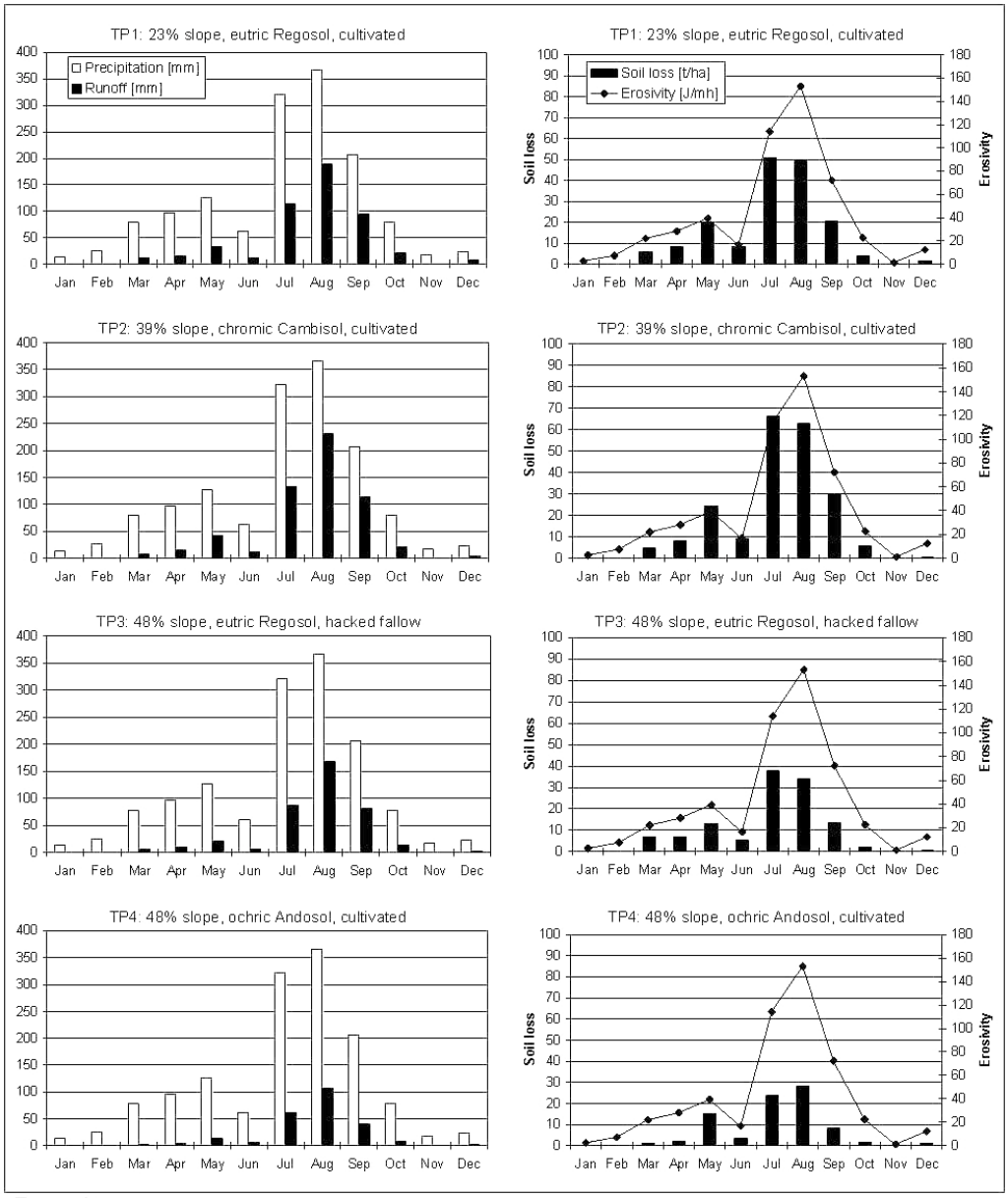


Figure 16-6: Mean monthly rainfall, erosivity, runoff, and soil loss on test plots in Andit Tid (July 1982 - end of 1992, Andit Tid)

16.2 Maybar in Wello

The Maybar catchment, comprising 112.8 ha of hydrological catchment is located at 39°40' E; 11°00' N in South Wello, Amhara Region; 14 km SSE of Dessie with an altitudinal range from 2,530-2,858 m asl.

Station Overview

Location	39°40' E / 11°00' N. Region: South Wello; 14 km SSE of Desse
Altitudinal range	2,530 – 2,858 m asl
Catchment size	Hydrological catchment: 112.8 ha Topographical catchment: 114.04 ha
Climate	According to Thornthwaite: sub-humid Mean annual temperature: 16.4 °C Mean annual rainfall: 1211 mm Length of growing period: 175 days
Geology	Volcanic Trapp series with alkali-olivine basalts
Soils	Mainly Phaeozems and Lithosols, Gleysols in the lower part of the catchment
Soil degradation status	The soils of the steeper part of the catchment are highly eroded, the soils of the flood plain profit from soil accumulation. Soil fertility is defined through the soil depth (nutrient storage capacity)
Agro-ecological classification	Upper *moist Weyna Dega to* lower *moist Dega*
Farming system	Rainfed, subsistence-oriented farming system with ox-ploughing
Main crops	Cereals and maize
Climax vegetation	Coniferous forest with Juniperus procera and Podocarpus gracilior
Population density (catchment)	188 inhabitants per km^2
Mean size of landholdings	Catchment: 0.5 - 1 ha per household plus collective use of closed areas
Livestock holdings (catchment)	1981: 7.4 animals per household, thereof: 1.2 oxen 1982: 8.1 animals per household, thereof: 1.1 oxen 1983: 9.8 animals per household, thereof: 1.2 oxen 1987: 12.1 animals per hosuehold, thereof: 1.4 oxen
Station established in	June 1981

Climate and agro-ecological classification

Maybar is located in the Moist Weyna Dega /Moist Dega agro-climatic zones. According to Thorthwaite it is classified as sub-humid climatic zone with mean annual temperature of 16.4° C, mean annual rainfall of 1,211 mm and a growing period of 175 days. The standardized climate diagram for Maybar in Figure 16-9 shows a bimodal rainfall regime with one dryer month (June) between *belg (*small rainy season) and *kremt (*main rainy season*)*. During 5 months (April to May and July to September), mean monthly rainfall exceeds 100 mm. November and June show arid conditions.

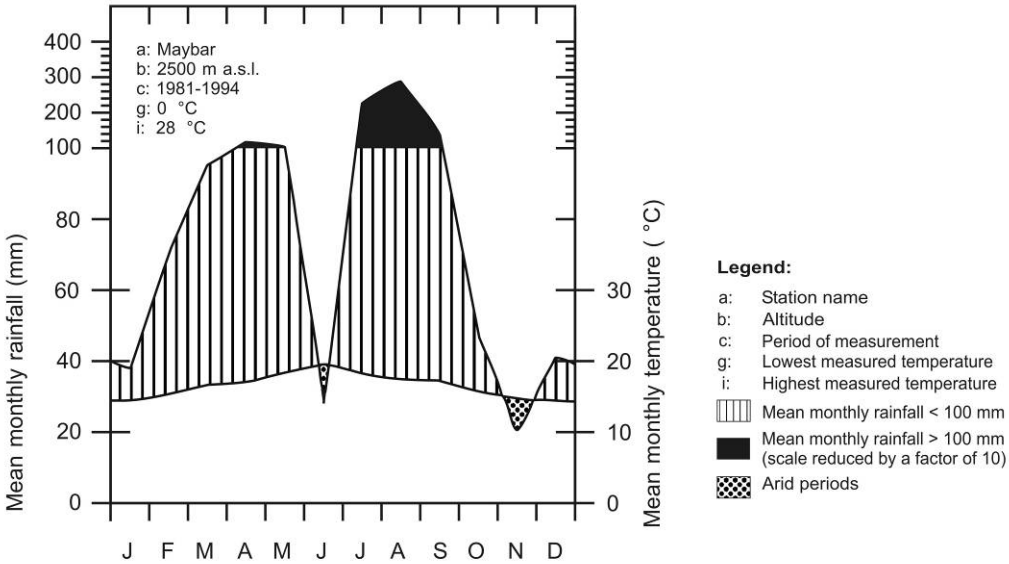


Figure 16-7: Climate diagram for Maybar at 2530 m asl

Geology and soils

The Maybar catchment is situated on volcanic Trap series, mainly consisting of alkali-olivine basalts. Soil genesis and properties are mostly influenced and defined by topography, soil erosion features, and accumulation surfaces since the geological formation and thereby the parent material for the soils developed is assumed uniform through out the catchment. More than 50 percent of the catchment land area is covered by shallow Phaeozems, associated with Lithosols, i.e. extremely shallow to shallow (soil depth 0-50 cm, with an average of about 15 cm), stony dark brown clay loam soils, mostly excessively drained and well structured. Due to limitations in moisture and nutrient storage capacity these soils are not suited for crop production. Since these soils occur on steep slopes, rooting depth is also limited. Severe erosion hazard also limits these soils from being used for crop production. The moderately deep to deep Haplic Phaeozems, covering one fifth of the catchment area are dark brown, stony clay loam soils. They have well developed structure are generally well drained occurring mainly on concave, moderately steep slopes covered in some places by natural woodland or remnant forest, even on steep slopes. These soils are used for intensive crop production.

The colluvial and alluvial accumulation surfaces on less steep slopes and outer parts of the valley bottoms are characterized by deep Haplic Phaeozems covering about 7% of the area. These dark brown, sometimes grayish dark brown, stony clay loam soils have a moderate, in flatter areas even imperfect drainage. This can cause problems for crop production during wet seasons. In some places, these soils, which used to have a high agricultural potential are now showing severe signs of degradation in terms of loss in organic matter and soil fertility decline. Due to their physiographic position, crop cultivation on these soils suffers from periodic flooding. Hydromorphic soils also occur in the central part of Maybar occupying the valley bottoms. The Mollic Gleysols have a

very high water table and are often water logged and swampy. A sub-division into two types of these soils is essential from the soils management point of view. Those Molic Gleysols with a water table rising to within 20 cm of the soil surface during the rainy season are not suitable for crop cultivation. The second types are soils with a water table within 20-50 cm below the surface and are used for crop production in many places. Farmers, however complain from periodic waterlogging encountered even when they construct small drainage ditches. Fluvisols and Regosols cover only 1% of the entire catchment land area.

Farming systems and socioeconomic setting

The people of the Maybar catchment exercise a rain-fed, subsistence oriented mixed crop-livestock production farming system with ox drawn farm implements. The major crops are tef, wheat, barley, pulses and maize. The climax vegetation in the area is dominantly coniferous forest with *Juniperus procera* and *Podocarpus glacilior*.

The population consists of Amhara people with a major religion of Islam. Religious authority, and associations are traditionally highly respected and powerful in the community. The management of common properties and communal socio-economic activities are also in the hands of the religious leaders. The local political affairs including land administration are undertaken through the Peasant Association. After the land proclamation of 1975, which provided land to the tiller by distributing land to resident members of the Peasant Association, land became the State property. The 1995 Ethiopian constitution placed land in the hands of the State governments and provides the land users to inherit the land to their kin, lease it for long term arrangements and enter also into other forms of land transaction but not sell it as a commodity or hold it as a collateral for loans and credits.

The land holding varies from 0.5 to 1.0 ha depending on family size. Common holdings are managed and used collectively. Smallholdings coupled with low yields make it difficult for a family to subsist. In the early 80's more than half of the catchment was used for grazing. In 1984, area exclosure was introduced in Maybar in order to protect marginal land from anthropogenic induced interference and further degradation. After that, drastic reduction of sediment load was observed and measured in the catchment. In general, the situation in Maybar is characterized by poverty. Population pressure is high. Individual landholdings are very small and yield per unit area is low. Fallow periods have been shortened to almost nothing (Lötscher 2003; Belay Tegene 2000).

Farm animals are important in Maybar. Oxen are needed for plowing and along with cows, heifers, bulls, mules, horses and donkeys for threshing crops. Mules, horses and donkeys transport goods and people. Small ruminants are raised mainly for sale to supplement income from crop production. Farm animals are also considered as assets in case of crop failures or for sale when cash is needed for other social activities. Only a few farmers (20 percent) own a balanced combination of species such as a pair of oxen, one cow, a heifer, a donkey, a mule or a horse, a few sheep, and a few other animals. The majority of the families (60 percent) own only few animals, for example

one ox, one cow, one heifer, one donkey, and a few sheep. The rest of the families (about 20 percent) own either very few animals – mainly one ox or one cow, a donkey, and a few sheep – or none at all. Since there is an acute shortage of fodder in the area crop residue is the main component of animal feed. All crops are harvested close to the ground to collect as much fodder as possible. Use of commercial fertilizers is very limited because of high cost and using compost and manures is minimal owing to the difficulties of transporting in masse (Lötscher 2003).

Runoff and soil erosion

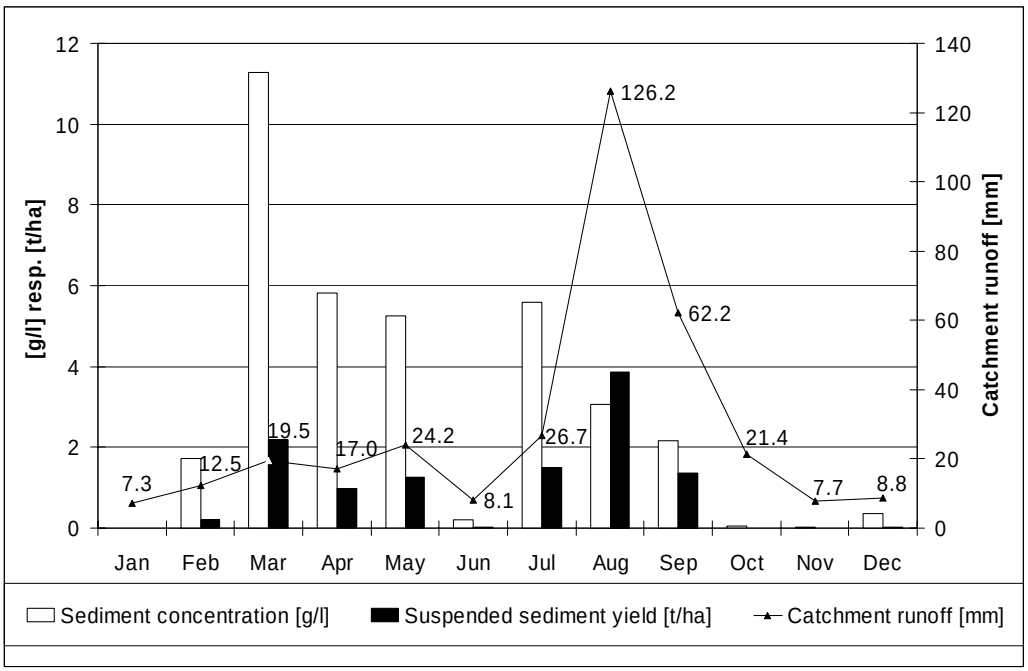


Figure 16-8: Mean monthly catchment discharge and suspended sediment yield in Maybar (1982 – 1992) (Bosshart 1999)

Soil and water conservation in Maybar

Maybar Research Station was SCRP's first research site. It was established in Wello, in North-Central Ethiopia in June 1981 in an environment with seemingly favourable conditions, two rainy seasons per year, and farmland at medium altitudes suitable for most crops. However, in 1984 extreme drought conditions dramatically increased the negative impact of steep slopes and considerable degradation, and revealed how vulnerable this highly populated area is to food shortage. Soil conservation in the form of level soil and stone bunds was introduced in the research catchment between March and July 1983 through a Food-for-Work campaign conducted by the Ministry of Agriculture. Some area closures followed in 1986 when approximately one tenth of the population of the local Peasant Association was resettled to Wellega, only to return some years later. Today, the catchment features partly stabilised terraces, some afforestation land, and a few steep slopes that are still cultivated. Land degradation remains a problem, though its scope is less dramatic than in 1981.

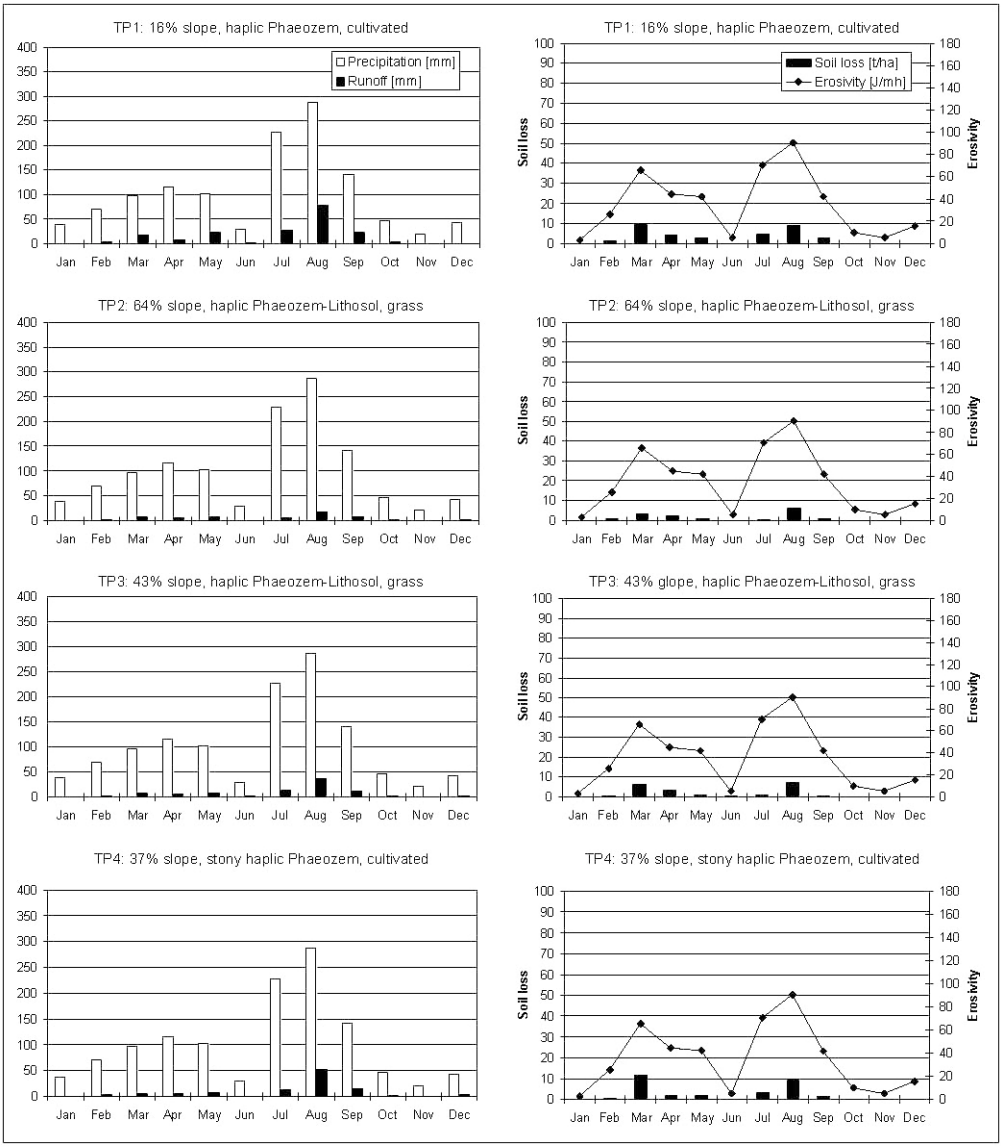


Figure 16-9: Mean monthly rainfall, erosivity, runoff, and soil loss on test plots in Maybar (1982 – 1993)

16.3 Anjeni in Gojam

Anjeni is found in Dembecha, Amhara region, northwest of Addis Abeba located at 37°31' E, 10°40' N. The area is relatively densely populated with approximate density of 125 persons per square km (Gete Zeleke 2000).

Station Overview

Location	37°31'E / 10°40'N. Region: Gojam; 65 km NNW of Debre Markos, 15 km north of Dembecha
Altitudinal range	2,407 – 2,507 m asl
Catchment size	Hydrological catchment: 113.4 ha; Topographical catchment: 108.2 ha
Climate	According to Thornthwaite: sub-humid Mean annual temperature: 16°C Mean annual rainfall: 1,690 mm Length of growing period: 242 days
Geology	Tertiary olivine basalt and tuff
Soils	Mainly Alisols, Nitosols and Cambisols
Soil degradation status	Medium to high degradation. Generally moderate soil fertility
Agro-ecological classification	*Wet Weyna Dega*
Farming system	Rainfed, cereal-based mixed upland-system, smallholder, ox-plough farming
Main crops	Barley, wheat and tef, various beans and oil crops
Climax vegetation	Broadleaf Arundaria forest (original potential)
Population density (catchment)	193 inhabitants per km^2 in 1991
Mean size of landholdings	1986: 2.2 ha; 1991: 1.9 ha per household
Livestock holdings (catchment)	Cattle: 5 (thereof 2 (1.86) oxen); horses, donkeys and mules: 1; sheep and goats: 4
Station established in	March 1984

Climate and agroecological classification

The area of Anjeni is contained within the agro-climatic profile of Mt. Choke at an altitude of 2,405 to 2,500 m asl. lying at the transition zone of Weyna Dega and Dega agro-ecological zones. It shows the characteristics of a Wet Weyna Dega zone with a unimodal rainfall regime with five months during which rainfall exceeds 100 mm (Figure 16-13). The months from November to March show arid conditions with an aridity index according to Martonne and Lauer (SCRP 2000) for these months is below 20. The climate according to Thornthwaite is sub-humid characterized by a pronounced rainy season between May and October with a mean annual rainfall of about 1,690 mm, mean annual temperature of 16° C and a growing period of 242 days. The long-term mean annual minimum and maximum temperatures of the area are 9.03 and 23.3° C, respectively. The mean monthly minimum and maximum temperature range between 6.2 and 26.1° C with a lowest recorded temperature of 0° C and the highest has reached 33° C (Gete Zeleke 2000; Bosshart 1997).

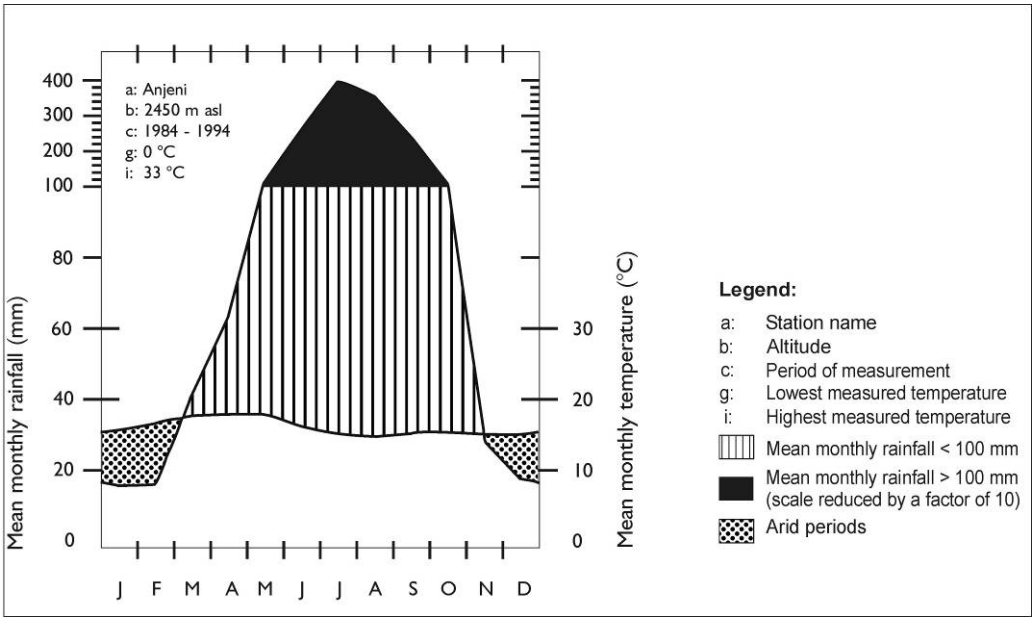


Figure 16-10: Climate diagram for Anjeni at 2407 m asl

Geology and soils

The geological formation of the catchment area belongs to the basaltic Trapp series of the Tertiary volcanic eruptions and is similar to most parts of the central highlands of Ethiopia (Gete Zeleke 2000). The topography of the area is typical of Tertiary volcanic landscapes deeply incised by streams, resulting in the current diversity of landforms. The genesis of the soils is then from the volcanic and reworked material and rarely from sedimentation processes. According to Gete Zeleke (2000), the soils of Anjeni vary within a short distance resulting in eight major soil units and ten sub-groups. Alisols cover 41 percent of the total land area of the catchment occupying the valley floors and the depressions of the foothill land units. The gently sloping, convex to linear land units are covered by the medium deep Nitosols amounting to 23.8 percent of the land cover. The steepest land units are convex shaped and covered by the Regosols and Leptosols (12.4 percent) which are shallow in depth that are assumed to be derived from the truncation of the Nitosols in the process of degradation by soil erosion. The hilltop of the catchment and partially the medium steep sloped land units are covered with moderately deep Dystric Cambisols (19 percent). Pockets of Luvisols, Lixisols and Acrisols are also found on different land units in the catchment.

The soils of the catchment are generally acidic and low in organic matter; have low to medium total nitrogen and available phosphorus. The cation exchange capacity of these soils is high probably related to the high clay content. The wide coverage of the relatively shallow Cambisols and the very shallow Regosols and Leptosols is a clear indication of the land degradation processes going-on in the area.

Farming systems and socioeconomic setting

The Anjeni catchment is located in the upper part of the Wet Weyna Dega and is typical representative of the intensively cultivated area in Gojam. The traditional

farming system of land use was adapted to a natural environment with low population and livestock densities. It was characterised by long fallow periods, reliance on natural vegetation and minimal pressure on grazing land. However, increasing human and livestock population has put tremendous pressure on the land, that land degradation processes are clearly observed (Gete Zeleke 2000). The study by Gete Zeleke (2000) shows that the total population and population density of the Anjeni area increased by 185 percent and 43.85 persons per km^2 in 1957 to 125.26 persons per km^2 in 1995. The same study also show that the natural forest cover decreased from 27.1 percent in 1957 to 0.3 percent 1995. On the other hand, cultivated land increased from 39.4 percent in 1957 to 77 percent in 1995, particularly of interest here is that the push for cultivated land into grazing, bush land and marginal lands is increasing. This is explained by the increase in cultivation of steep slopes (from 19.4 percent in 1957 to 79.5 percent in 1995).

The population of Anjeni is Amhara who are adherents of the Orthodox Christian faith where church and religious beliefs have a considerable influence on farm activities. Numerous holidays, some with strict rules are an integral part of the agricultural calendar that may interfere with the organization of soil and water conservation works. The farming system in Anjeni features both the up-land cereal based system and the smallholder mixed system of agriculture (Ludi 1997). Crop production and livestock rearing are closely linked in Anjeni but not well integrated into the farming system. Trees that produce fruit and fodder, vegetables and tubers are completely lacking. The main emphasis in farming is clearly on cereals, pulses and oil seeds. Mixed cropping is only found around homesteads only where maize, potatoes and rapeseed are produced. All other crops are planted as monoculture. There is no agroforestry with the exception of planting rows of Gesho in homestead gardens surrounded by Eucalyptus (Ludi 1997). Plowing is done with ox-drawn implements.

Livestock play an important role in the land use system as a source of production, food, income security and symbol of status. Providing fodder for livestock is one of the major problems encountered by the inhabitants of the area limiting the desire to have more cattle since the extent of the grazing lands has decreased substantially whereas the population of livestock increased tremendously (Ludi 1997). One of the problems that prevent poor households from becoming food self-sufficient is the lack of oxen for plowing their land since 28.4 percent of the population is not having a pair of oxen. The remaining has one pair (52.6 percent) or more oxen (19 percent).

Runoff and soil erosion

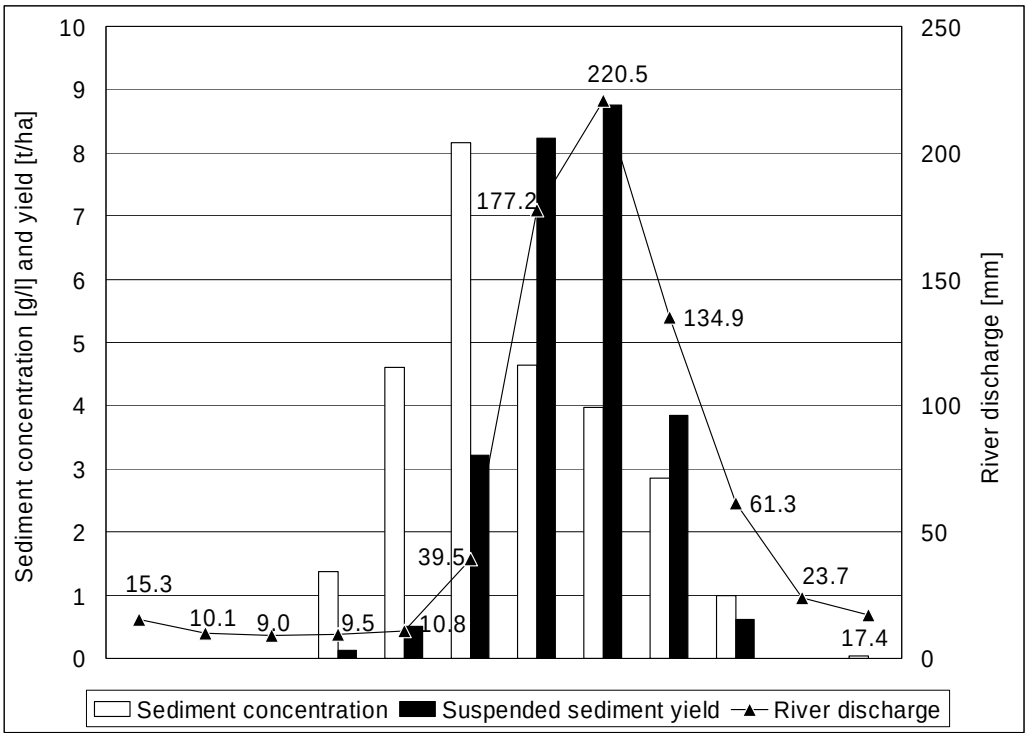


Figure 16-11: Mean monthly catchment discharge and suspended sediment yield in Anjeni (1984 - 1993, Minchet catchment, Anjeni) (Bosshart 1997)

Soil and water conservation in Anjeni

Anjeni Research Station was established in March 1984 as the fifth SCRP research site. Situated in the Gojam Highlands in North-Central Ethiopia, the catchment lies at a favourable altitude and has optimum climatic conditions. Consequently, it is intensively cultivated; there are practically no fallow periods, and present soil and sediment loss rates are extremely high. Ethiopia's "bread basket" – as the region is called – is threatened by loss of potential within very few years. The population pressure is high in the area, and population density is already considerable. A new soil conservation technology and approach was introduced in Anjeni, first in a small area outside the catchment in 1985, then in the whole catchment from February to April 1986. In terms of technology, carefully designed graded *Fanya Juu* structures such as those originally introduced in Andit Tid Research Station were used to conserve the agricultural land. The local communities agreed to a non-grazing system for an initial three years; this measure included some reforestation and area closure. The conservation approach included negotiations conducted with the communities, who agreed to do conservation work on their land in exchange for a clinic jointly built by SCRP and the communities. This approach, entitled 'social infrastructure for soil conservation', was very successful, as both the conservation measures and the clinic exist to date. The structures in the catchment, however, were adapted several times, leading to a compromise between ecological, social and agronomic requirements.

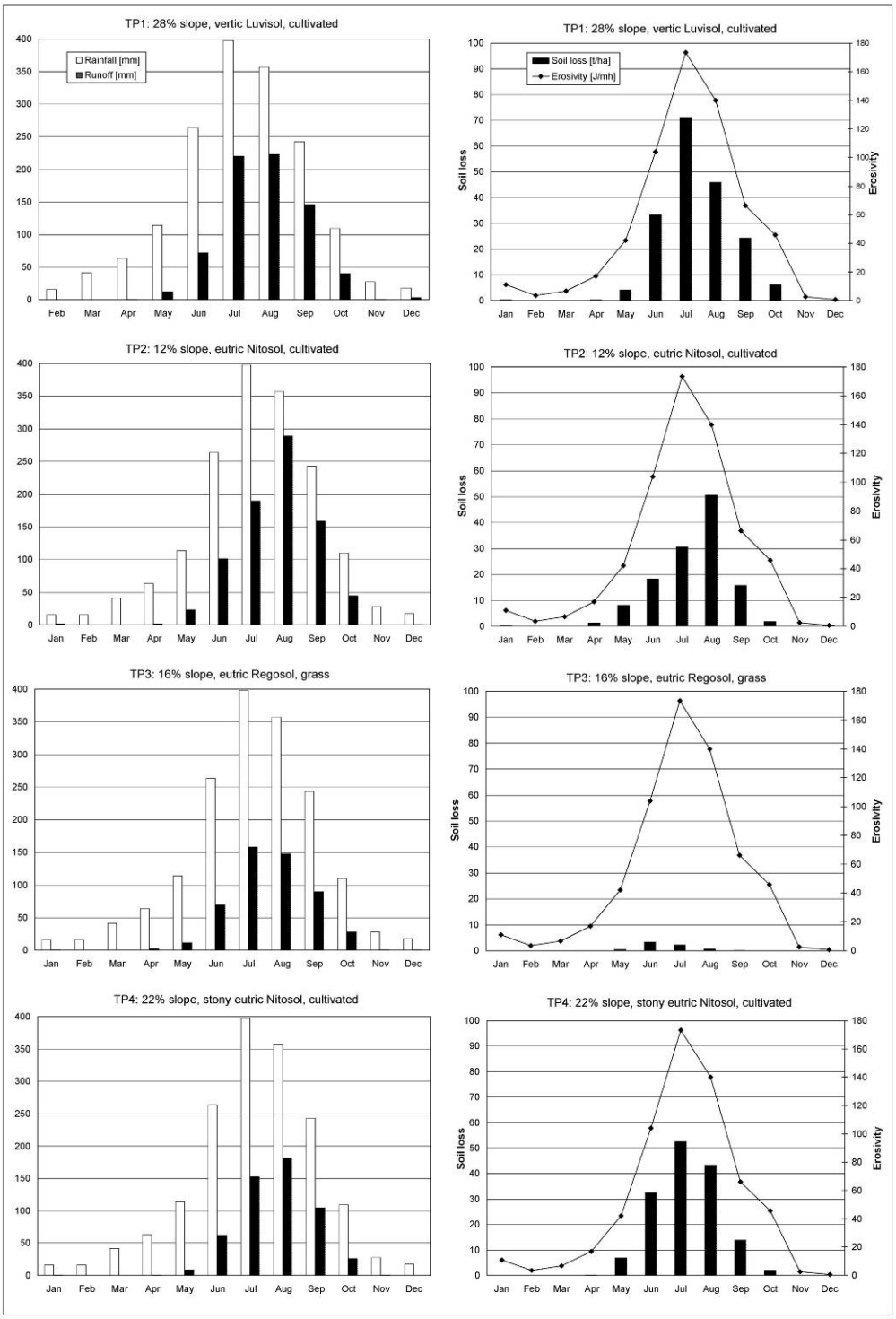


Figure 16-12: Mean monthly rainfall, erosivity, runoff, and soil loss on test plots in Anjeni (1984 - 1990 and August 1991 - 1993, Anjeni)

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17 Wirgesa and its environs: land use and land management dynamics in an Ethiopian case study

Amare Bantider

17.1 Basic data

Topography and drainage: The area is part of the eastern escarpment of northwestern highland system of Ethiopia. It is bordered in the east by northern part of the Ethiopian rift valley. It is composed of rugged topography with highly raised peaked and relatively low and plain lands. The area has the relative relief of >2,000m (ranges from <1,500 to 3,569 m asl). Several streams originate from the escarpment, usually forming deep and narrow channels and contribute to the main tributary of Awash River called Mille.

Climate: The weather station available in Wirgesa town measures only rainfall. The mean annual rainfall (from 1963-1999) is 1,441 mm yr^{-1}. It is distributed over two seasons and hence the area is bimodal rainfall regime: small rainy months called *belg* from January to May (Peak in April) and main rainy months called *Kiremt* from July-October (peak in July and August). The rainfall variability is high. The CV of annual rainfall is 24.44 percent but it is very high for almost all monthly rainfall distribution.

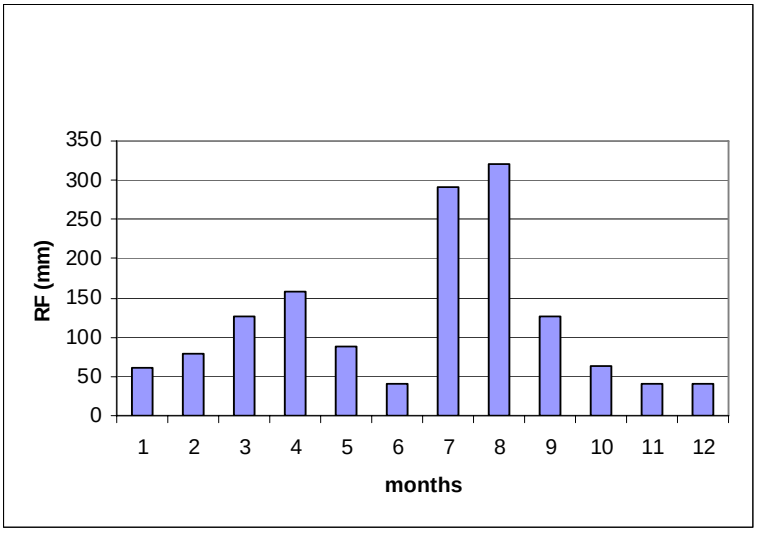


Figure 17-1: Mean monthly rainfall at Wirgesa (1962-1999)

Soil: The major soil types in the hillsides and mountain slopes are Histic Leptosols, Lithic Leptosols, Regosols and Calcaric Cambisols. On the depositional areas and on

flat to nearly flat areas including the valley floor the major soils are, Eutric Fluvisols, Luvic Phaeozem, Vertisols and Vertic Luvisols.

Geology: This area is within tectonic blocks of the western plateau of Ethiopia. Its geology is chiefly formed by basic volcanic rocks and associated sediments. Based on major differences in lithology and field relationship, they are porphryitic basalt, aphanitic basalt, pyroclastic rocks and quaternary sediments. Fossil fuel is also found in the area.

Settlement and Population: Taking the establishment of oldest churches in the vicinity as proxy data, the area seems began to be densely inhabited since 15th century (this does not mean that the area was unoccupied before this period). Today it is densely inhabited. The estimated crude rural density is >200 persons per km^2 and the agronomic density (i.e., population: cropland ratio) is also >400 person km^2 (this does not include the inhabitants of the towns). The major economic activity in the area is mixed agriculture. Christianity and Islamism are the two dominant religions, and both of them are in coexistence for centuries. The people are dominantly Amharic speaking.

17.2 Overview map

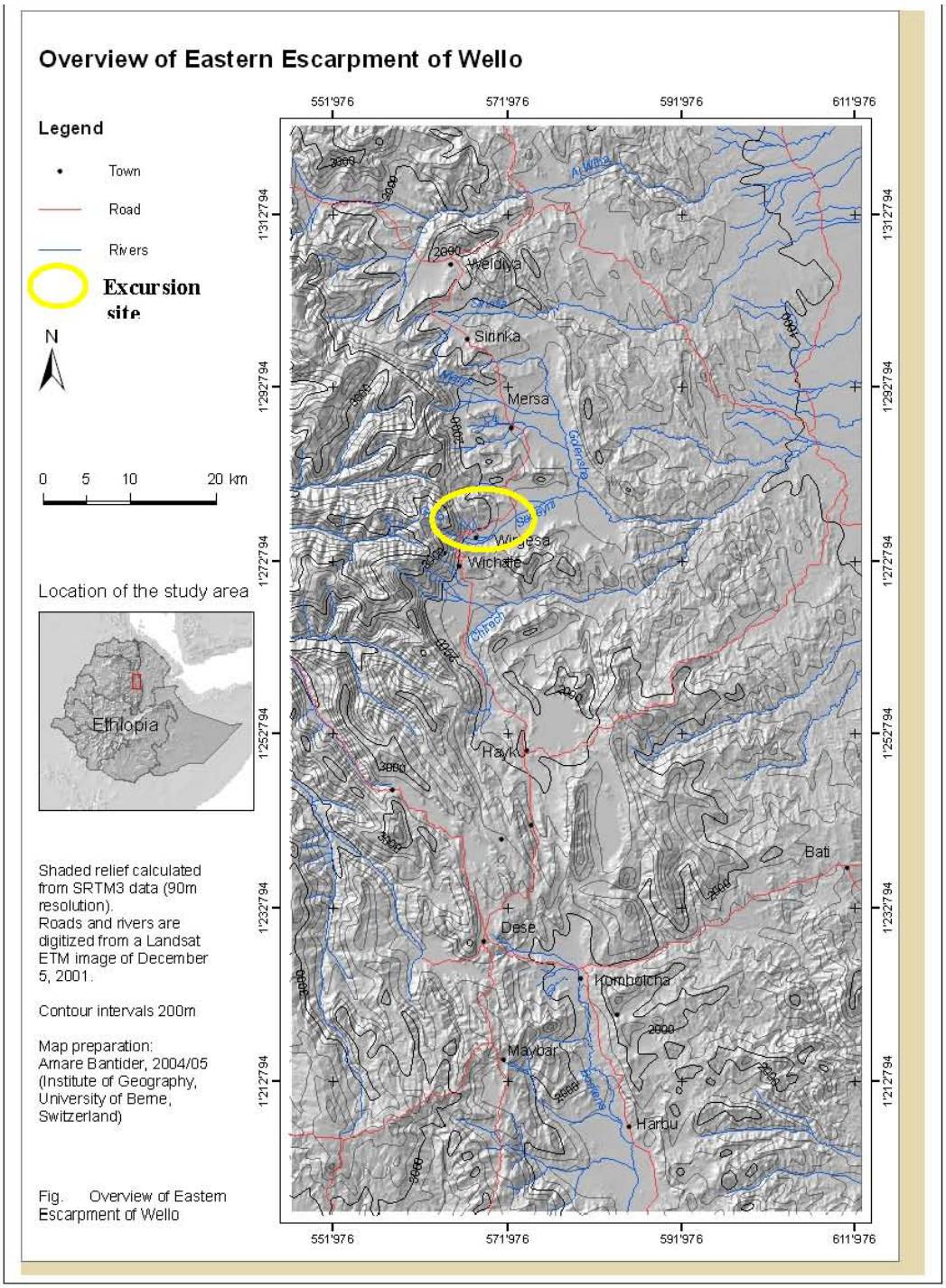


Fig. Overview of Eastern Escarpment of Wello

Note: In Wirgesa and its environs we will make two stops. During the first stop we will discuss about land cover change, land management and expansion of fan. At the second stop, we will discuss about paleo ecology, gully erosion and results of fluvial erosion

17.3 Dynamics of land use / land cover, land management and land degradation

Wirgesa and its environs have experienced dynamic land use/land cover and land management history. The climax vegetation of the area is composed of afro-montane vegetation species up to around 3,000 m asl of altitude and sub-afroalpine heather tree species (Erica and Hypericum sps) and sub-afroalpine grass and herbaceous species above 3,000 m asl. The focus group discussion has revealed that before 1940s mountain and hillside slopes were covered by natural vegetation. Agricultural practices were limited to the valley floor and to flat/gently slopping areas. After 1940s, however, significant land ownership right re-arrangement occurred, first by the Italian invading force (1935-1940) and latter after liberation by Ethiopian government in 1949. This tenure re-arrangement had caused eviction of several farmers from their fertile valley bottom farms. This led the evicted farmers to deforest the hillsides and steep slopes for cultivation, which caused accelerated soil erosion. After the radical land tenure change in 1975 (after the down fall of the imperial regime by socialist oriented Military government of the *Derg*), land rehabilitation works have undertaken. The present land cover of this area is basically works of these periods. The picture (Figure 17-2) and a set of aerial photographs (Figure 17-4) and the explanation thereof depict the processes and chronology of land cover and land use dynamics since 1940s.

The picture (Figure 17-2) below (from letter A-H) shows several facets of land cover and land use dynamics, which is typical for Eastern Escarpment of Wello (See also figure 17-4 for comparison of land cover of the area)

A. This is the highest peak in the area called *Bizen* and it is 3,569 m asl. The range of mountain chains aligned in North-South direction is a water divide between Awash river basin and Abbay (Blue Nile river basin)

B. The climax vegetation of the area comprises afromontane vegetation species (among the tree species: Juniper, Podocarpus, Hagenia, Olea, Dodonia, etc), sub-afroalpine heath (Erica and Hypericum) and sub-afroalpine meadow. As it is seen today, the afromontane species are found intact and more or less protected from the human direct use at the mid altitude, represented in the picture by letter C. The area designated by letter B, though the topography is very steep, was deforested between early 1940s and late 1950 and converted to cultivated and grazing lands. At present it is heavily degraded and unsustainable at all. Despite SWC activities are practiced in several places, this practice is very rare in this very degraded area. It covers around 4.5 km^2 and currently the estimated population residing in this very degraded escarpment is about 790 peoples in which the crude density is turned out to be around 175-peoples/km^2.

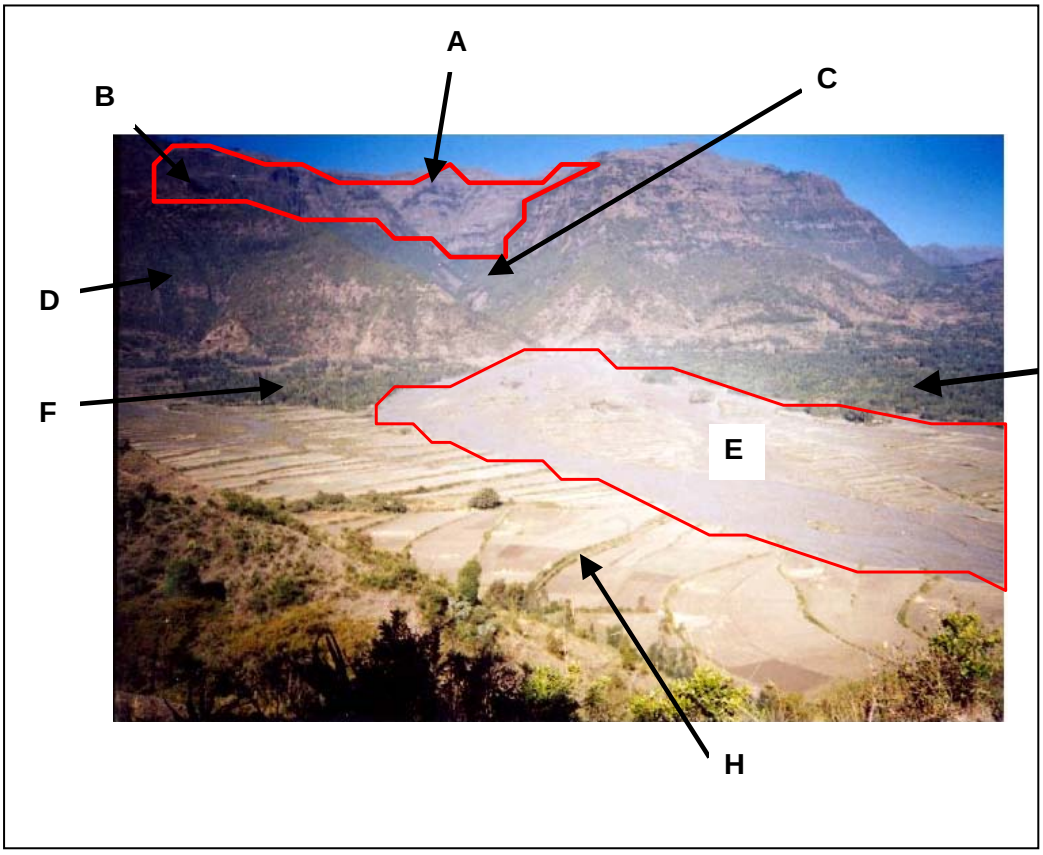


Figure 17-2: Land cover, land use and land degradation in Golo watershed near Wirgesa (Photo Amare Bantider 2004)

C. This is the remnant secondary natural forest in the area. It is rich in biodiversity. For example the tree and shrub species richness index is about 15 species per 400 sq m. Although the habitat size is small there are many wild animals that believed to exist in this forest including large mammals. Since 1950s, this forest was recognised as state forest and currently is managed by the regional government through forest guards. Informants reported, however, that the management is not effective where tree cutting by timber mafia is widely observed. Interestingly, before the 1950s the forest was said to be extremely diverse, closed and trees were very large in size. That time it was managed by local institution called ***amestu betula*** (it was a council composed of five elders drawn from the near by five villages). This institution had very effective laws for protecting the forest where violating the laws instituted by the council cause serious social sanctions and as a result every one was respecting it. Here the important lesson to draw is that local institutions were effective in good old days in resource management, at least in some place.

D. This hillside was completely deforested, converted to cropland and grazing between 1949-1978 by the evicted farmers in 1949 from their valley bottom cropland. As a result, by the beginning of 1970s it was one of the extremely degraded areas of the escarpment of Wello. In 1978 it was closed for natural regeneration and still closed from direct human use and livestock grazing.

Given the excessive timber cutting in early 1990s during power vacuum still it is possible to see the resilience of the ecosystem after extreme degradation, if it is left for natural rehabilitation.

E. This is a fan covered by debris and boulders that transported from upslope (the hot spot zone where this debris originated is indicated by letter **B** in the picture). According to the informants, before 1939 it was covered by dense forest/jungle of different tree species and was said to be a place for the breeding ground of Hyena and habitat for other several wild animals. The stream was so narrow. It was first deforested by the landlord of this place in 1939 and converted to cropland. The same year, according to the informant, there was heavy rain and in that year such accumulation began. In 1964 part of this fan was occupied by dense settlement (village) (see Figure 17-2). At the moment no house is seen except few farms that covered with dense mulch of stones and boulders. In general about 50 households (houses) were relocated to the present day *Ambole-amba* village (letter F). The fan (this wasteland) is 67 years old.

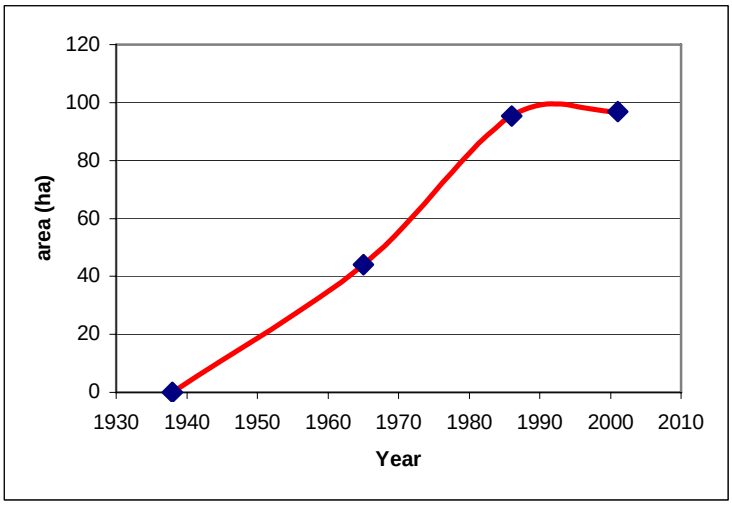


Figure 17-3: Expansion of fan area created by Golo river, Wirgesa

The fan area was measured from the aerial photographs of 1964 and 1986 and from satellite imagery of 2001. The rate of annual increment was: 1.76 ha yr^{-1} from 1939-1964, 2.34 ha yr^{-1} from 1964-1986 and 0.11ha yr^{-1} from 1986-2001. The over all rate was 1.56 ha yr^{-1}. It is important to note that the rate of fan expansion from 1986 to 2001 was so little compared to the preceding years and this basically seems the positive impact of closure and soil and water conservation activities undergone in significant part of the area, although not in all places. It is also necessary to give due attention that though the human activity is considered the major cause the extreme events of climate (heavy storms after long dry spell of dry months) also play significant role in the rate of accelerated soil erosion and mass movement (stone and debris down movement).

Note that land degradation in this area first initiated by human activity and latter reinforced by natural hazards (extreme storm), so human beings are major cause of land degradation.

F. Ambol-amba village that was established after the houses in the fan flooded.

G. Wirgesa town, established in 1949, was formerly a wereda capital. But due to the danger of flash flood, it transferred to Mersa. Foot slope settlements are at risk if the steep hillsides and mountain slopes are properly conserved and managed.

H. Soil and water conservation structures are a way forward towards sustainable land management.

17.4 Gullies in the area

Gullies are wide spread in the valley bottom where the land is generally nearly flat. According to the interview most gullies were formed since 1950s. Run on increased and became severe as the hillsides were deforested. Erosive storms after long dry spell of months is said to be the other major cause of gully development in the region. Among the surveyed gullies the expansion rate of two gullies presented below.

Gully 1: **Laymen**: According to an interview with an elder, before 1972 this was a very small channel (very narrow and shallow in depth). He said farmers of Gorarba village were simply jumping while they hold their farm implements (Yoke and beam of plough) on their way back and forth to their farms. In the 1965's aerial photograph, however, the width is measured as about six metres. In 2005 I measured it and it was 24 metres. Hence in the last 40 years the rate of bank erosion (bank retreat) was 0.45 metres yr^{-1}. In fact, significant (fast) bank retreat happened in years of heavy rain (storm) after long and strong dry spell of months. This example showed that gully erosion in the valley floor is a major threat that threatens the reduction of cropland year after year unless corrective measures applied on gully erosion and stream bank retreat.

Gully II: Gotu: This is a gully where a charcoal sample was collected for carbon dating immediately above the paleo-soil at the depth of 9.66m. The ^{14}C was dated for this sample and appear to be 29,460 years BP. This indicates that there has been natural forest fire up-slope before the advent of human being. The date further indicates that soils above the paleo-soils already began accumulating in the site since 29,460 yrs BP most likely by water erosion from the mountain slopes.

The deposited soil above the paleo-soil of this area is believed to be a fraction of soil that eroded from the mountains and transported down slope. The annual rate of soil deposition at this site as inferred from the dating is estimated at 0.003 cm yr^{-1}.

Examination of the profile of this gully also showed that layers/horizons are composed of different materials (some with fine earth materials and others with gravels and stony materials) with varied thickness, which indicates different intensities of erosion phases over millennia.

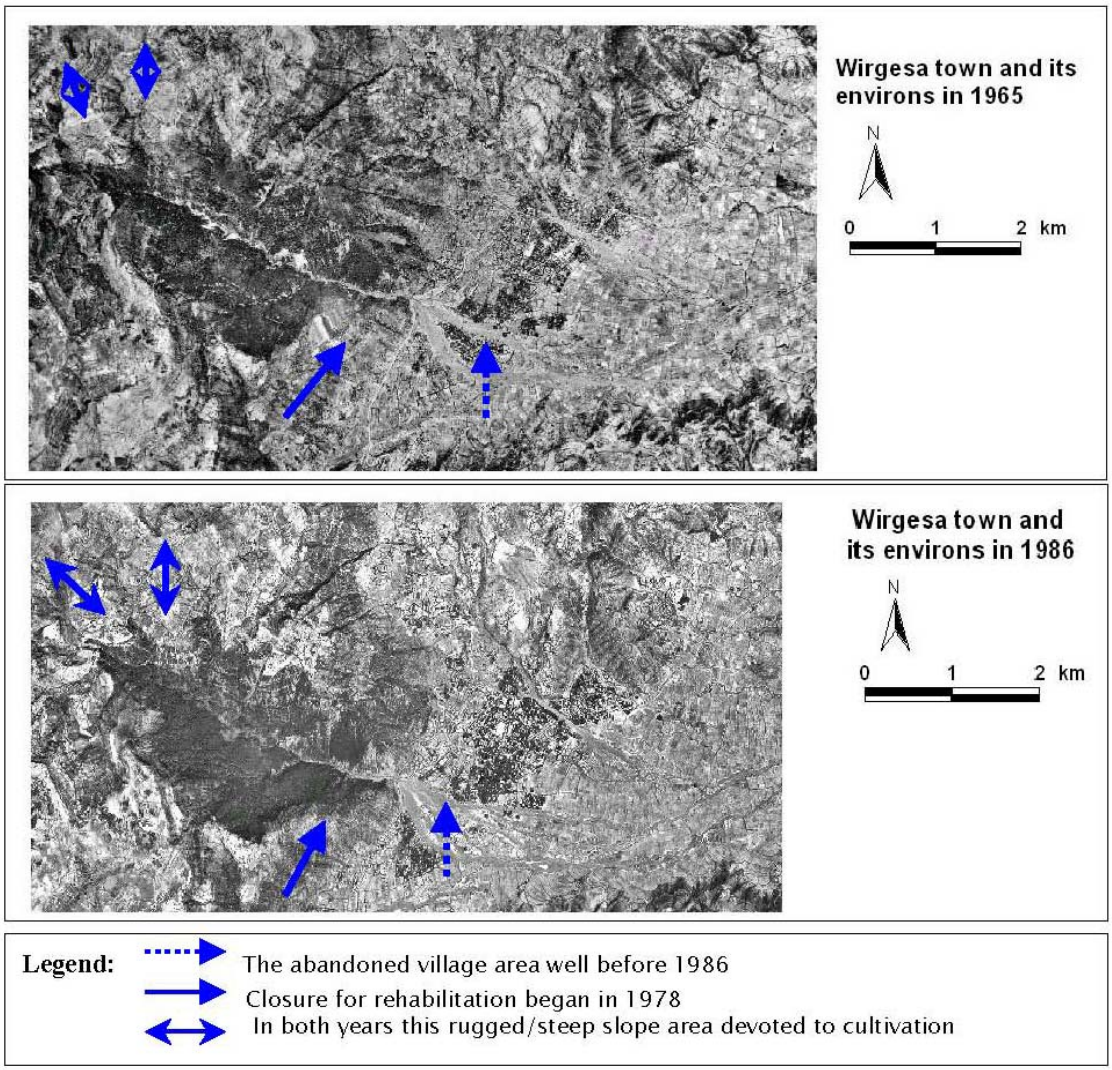


Figure 17-4: Comparison of land cover in Golo watershed, Wirgesa, in 1965 and 1986

18 Simen Mountains World Heritage Site in Northern Ethiopia

Hans Hurni and Eva Ludi

The following text components of Chapter 18 have been copied from Hurni and Ludi (2000).

18.1 General overview

The Simen Mountains in northern Ethiopia symbolise an area which is typical of the Ethiopian highlands at their extremes: Simen has a topographic ruggedness with steep escarpments – and with a breath-taking beauty of high touristic value. Simen has a rich natural biodiversity with altitudinal successions of fauna and flora and many endemic species of which the Walya ibex has become a national symbol, although it is now threatened by extinction. Simen has been inhabited by human land users for more than two thousand years and thus provides an outstanding cultural heritage and co-existence of religious groups. Simen has the highest peak in Ethiopia, Ras Dejen (4,533 m asl), where an alpine climate near 0°C persists all year round, sometimes even with a snow cover lasting a couple of days. However, this moist highland area is surrounded by dry lowland savannahs and deserts.

Unfortunately, Simen is also plagued with the typical features which have made Ethiopia world famous. Degradation of natural resources, particularly vegetation and soils, is widespread and leads to a chronic food deficit under present standards of mountain agriculture. Traditional farming, while preserving a high diversity of cultural plants, has very low standards of productivity. Contemporary technological, social and economic development is virtually absent in this remote area. Demographic trends since the 1950s show a doubling of the population every 25 years, resulting in scarcity of good land, shortening of fallow periods on shifting cultivation land, and deforestation even in the last remnants of natural forests.

Finally, Simen is blessed with outstanding wildlife in certain areas where some natural habitats remained. The Walya ibex in-migrated into Simen during the ice age (Nievergelt, 1981), only a few thousand years earlier than human land users. Because of this rare endemic animal, Simen received the attention of the global community, which called for its protection and survival. This external interest led to a national initiative to create a National Park in 1969, thus forming a protection area where nature should survive. Safeguarding the survival of the wildlife, however, soon conflicted with the interests of the human inhabitants of the area. It was argued that even without the

National Park the sustainability of the mountain livelihood systems of the people would not be guaranteed, because the remaining natural resources of the Park area would soon be consumed, and then what? Hence, protection should be enforced by any means. However, this line of thinking was difficult to justify in view of human starvation, which has affected some villages year by year, especially since the 1990s, even in the absence of climatic drought. Moreover experiences with Park enforcement in many countries during the 1970s and 1980s were mostly negative.

Figure 18-1: The Walya ibex of Simen has become a national symbol but is threatened by extinction (Photo Bernhardt Nievergelt, 1968)

Even without the National Park the sustainability of the mountain livelihood system of the people in the Park area would not be guaranteed, because the remaining natural resources in the area would soon be consumed.

Another view, supported in the present report, was to seize the opportunities offered by external interest shown in Simen. The long-term development goal should now be to preserve both the natural and the cultural heritage of Simen, by creating a protection zone for nature, a buffer zone to mitigate conflicts, and a development zone to provide better livelihood systems. Park and people side by side, benefiting from each other, supported by external means offered in exchange for global interest in Simen: this is the vision of the authors of this publication.

Figure 18-2: Soil degradation is widespread even within the SMNP, as seen here for the Gich area. This is a major threat to the survival of the local land users (Photo Hans Hurni, October 1994)

The long-term development goal should now be to preserve both the natural and the cultural heritage of Simen, by creating a protection zone for nature, a buffer zone to mitigate conflicts, and a development zone to provide better livelihood systems.

The primary goal of the Simen Mountains Baseline Study (SMBS) carried out between 1994 and 2000 (Hurni and Ludi 2000) was to create shared knowledge about people and natural resources in the Simen Mountains, with a focus on the National Park and its surrounding area. Its aim was to analyse trends, present needs and options in relation to resource use, resource conservation, and development from an internal and an external point of view, and synthesise knowledge and opportunities for sustainable development as seen by different stakeholders, be they land users, Park officials, Government administrators, tourists, scientists, or international development agents. The study was thus intended as a basis for decision-making by these different actor categories. It also aimed to give concrete recommendations about how to prioritise and plan multi-sectoral development activities. Finally, it served as a basis for monitoring and impact assessment, accompanying local and introduced development.

The Simen Mountains National Park (SMNP) is located in North Gonder Zone (NGZ), an administrative subdivision of Amhara National Regional State (ANRS) in north-central Ethiopia. The Park, with a total area of 136 km^2, is embedded in 8 Kebele Associations (KA), or communities, namely *Mindigebsa & Adisge, Abergina, Ambaras/Jona & Argin,* and *Lori* in the highlands, and *Adebabay, Agidamiya, Kabena*

& Sera Gudela, and Angwa & Kernejan in the lowlands[1], belonging to 3 different Weredas (*Adi Arkay*, *Janamora* and *Debark*). These eight KAs cover a total area of 471 km2 and consist of 30 villages which were all covered by the baseline survey. As there exists no official map with administrative boundaries, village and KA boundaries were determined during the field work and reflect the perception by villagers and community representatives in 1994 (KA Chairmen, Secretaries).

Table 18-1: Characterisation of altitude, land sizes, and population of villages in the study area inside and around SMNP (1994 data; Hurni and Ludi, 2000)

Wereda	KA	Village (Number according to Appendix)		Altitude m asl [c]	[d]	Village area ha	inside Park ha	inside Park %	Population (1994) House-holds	Persons
Adi Arkay	Agidamiya	Abeka	1	1,950	m	694	0	0.0	59	297
		Agidamiya	2	2,500	m	550	45	8.2	37	280
		Amba Ber	3	2,550	m	713	41	5.8	44	300
		Antola	4	2,550	m	1,059	375	35.4	55	280
		Aykotba	5	2,400	m	462	194	42.0	24	95
		Dirni	6	2,800	m	1,193	584	49.0	64	330
		Muchila	7	2,450	m	1,713	1,594	93.1	45	226
		Tiya	8	2,750	m	915	376	41.1	40	210
		Truwata	9	2,750	m	903	658	72.9	55	290
	Kabena & Sera Gudela [a]	Kabena	10	1,950	l	1,366	0	0.0	92	460
		Nariya	11	1,950	m	817	28	3.4	64	320
	Angwa &	Adiguyi	12	1,750	l	1,168	0	0.0	136	680
		Angwa	13	2,050	l	3,138	208	6.6	201	1,000
		China	14	1,950	l	1,269	0	0.0	167	830
		Flasha	15	2,000	m	1,624	1,199	73.8	81	400
	Kernejan	Adarmaz	16	2,300	m	618	618	100.0	40	200
		Kernejan	17	2,050	m	3,566	0	0.0	303	1,500
		Sera	18	2,050	m	1,219	169	13.9	91	450
Debark	Adebabay	Adebabay	19	2,200	l	1,253	0	0.0	280	1,800
		Debir	20	2,400	m	2,238	976	43.6	420	2,700
	Mindigebsa & Adisge [a]	Mindigebsa	21	3,200	h	2,341	96	4.1	340	1,582
		Michibiny	22	3,200	h	1,115	810	72.6	152	759
	Abergina	Abergina	23	3,300	h	911	96	10.5	240	2,050
		Gich	24	3,450	h	2,450	2,450	100.0	222	1,084
		Mecheka/ Tikur Wuha	25	3,200	h	1,586	583	36.8	210	1,800
	Ambaras/Jona & Argin	Ambaras/Jona	26	3,500	h	3,142	1,889	60.1	375	1,600
		Argin	27	3,400	h	2,421	195	8.1	350	2,400
Janamora	Lori	Amiwalka	28	3,100	m	2,652	401	15.1	326	1,700
		Lori	29	3,400	h	1,581	0	0.0	247	1,280
		Sona	30	3,450	h	2,392	0	0.0	165	840
		Sum				47,069	13,585 [b]		4,925	27,743
		Mean						28.9		

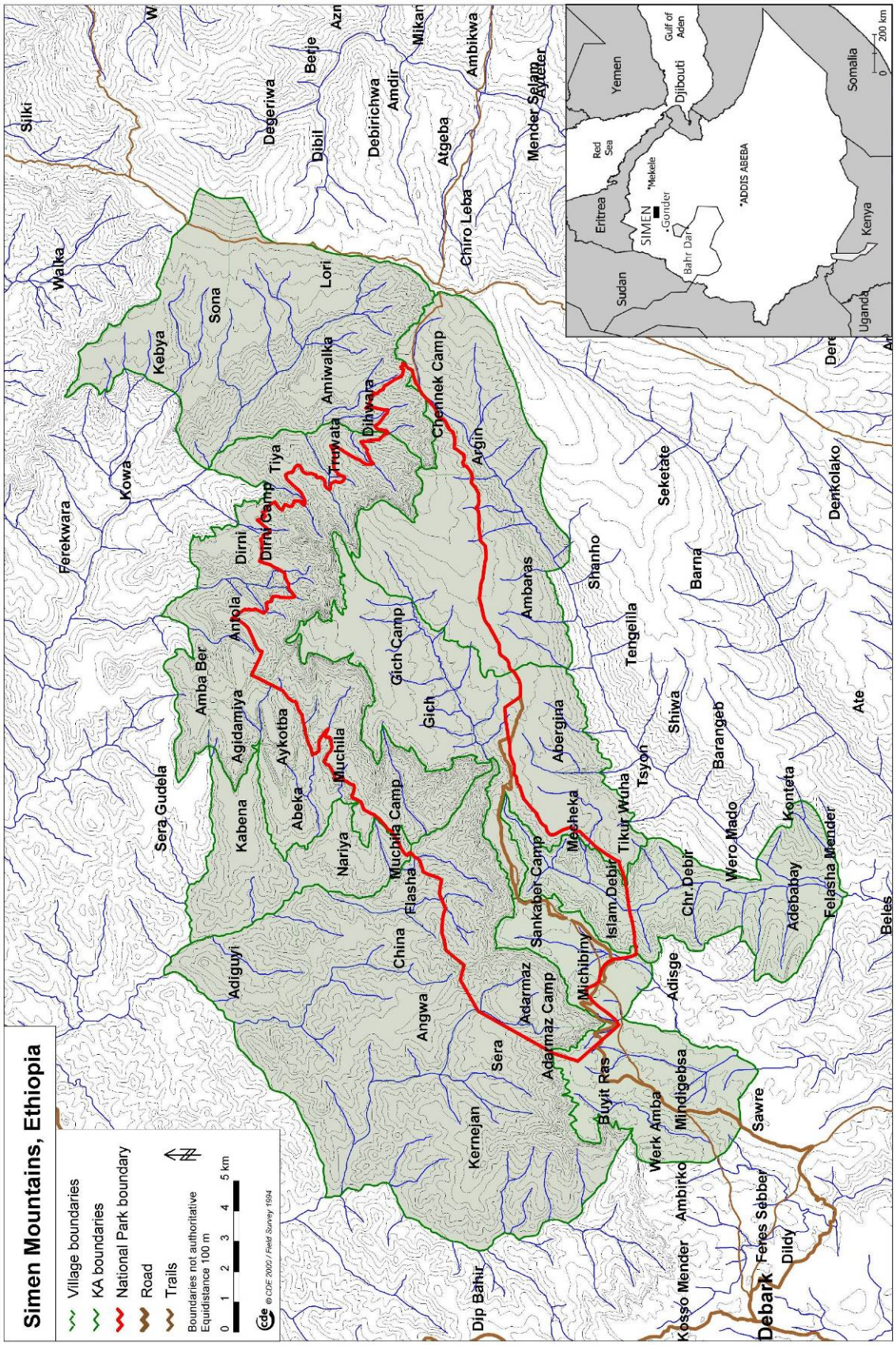
[a] only some villages of this KA; however, all villages with land inside the Park are included

[b] corresponds to total Park area (in hectares, ha)

[c] altitude of church / mosque (not of main agricultural area)

[d] altitudinal range of *main agricultural area*: h = highland > 2,800 m asl, m = medium altitude 2,000–2,800 m asl, l = lowland < 2,000 m asl

18.2 Overview map



18.3 Specific topics

Geology

The Simen area was built up by plateau basalt (Trapp series). A 3,000–3,500 m thick sequence of basaltic volcanic layers was deposited on Mesozoic sandstone and limestone that form a 500 m thick cover over the Precambrian crystalline basement (Kazmin 1973 in Hurni 1982). These layers are composed of numerous 5 to 50 m thick olivine-basalt lava flows, interbedded with tuff layers. The main part of the Simen area consists of remnants of a Hawaiian-type shield volcano, overlying the volcanic flows of the Trapp series. The shield volcano was mainly built up by augit-basalt flows several meters thick. The centre of this volcano probably lies northwest of the peak of Kiddis Yared, with Ras Dejen, Silki and Bwahit forming the outer rim of the crater. The extreme escarpment appeared to be preconditioned by an extended uplift of the whole massif during the Tertiary, comprising major faults which can be attributed to the Rift system extending over most of East Africa to the Red Sea. Harder rocks on the foot of the escarpment preconditioned the development of the terrace-like steps which today form a favourable area for settlement and agriculture (Hurni 1986).

Topography, geomorphology, and soils

The study area (cf. overview map in Chapter 19.4) extends from its lowest point at 1,350 m asl in the north-west to 4,430 m asl, the peak of Bwahit mountain. A very high relief energy is characteristic of the whole area. Four distinctive geomorphic units can be differentiated (Hurni 1986):

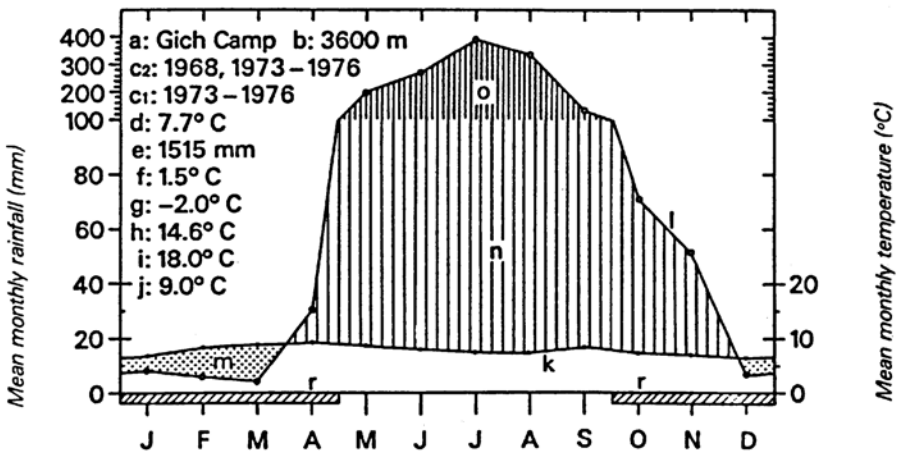
- the deeply incised lowland valleys below 2,000 m asl;
- the lowland terrace-like steps (roughly at 2,000 m asl), which comprise the main cultivation and settlement area of this belt;
- the steep escarpment between 2,000 and 4,000 m asl, extending in a SW-NE direction, which forms the main wildlife habitat;
- the highland plains and valleys South of the escarpment, a densely settled and cultivated area.

Soils and water are central natural resources of the agricultural and natural system, they are described in detail in Hurni and Ludi (2000).

Climate

Rainfall in Simen and the larger region is presented in Figure 18-3. The pattern in the Simen Mountains is characterised by one single rainy season with high amounts between June and September, whereas there are two smaller rainy seasons east of the Tekeze River in Tigray and North Wello (Wag). Accordingly, the risk of variability leading to drought is high in these latter parts, but has so far been much less pronounced in Simen. Daily temperatures vary between 27°C annual mean in the lowest parts of the study area at 1,350 m asl in the Tekeze Valley, and 2°C on the highest peak in Simen, Ras Dejen, at 4,533 m asl outside the study area. In the study

area, rainfall varies between less than 1,000 mm in the lowlands and more than 1,500 mm in the highlands. In Gich Camp, a longer-term average of 1,515 mm was measured in 1968 and 1973–1976, with a mean annual temperature of 7.7°C at 3600 m asl (Hurni 1982).



Legend:

- *a: Climatic station*
- *b: Altitude (m asl.)*
- *c_1: Measuring period temperature*
- *c_2: Measuring period precipitation*
- *d: Mean annual temperature in °C*
- *e: Mean annual precipitation (rainfall)*
- *f: Mean daily minimum temperature of coldest month (NOV, DEC): 1.5° c*
- *g: Absolute minimum temperature (JAN 1974, NOV 1975, JAN 1976): –2.0° C*
- *h: Mean daily maximum temperature of warmest month (APR): 14.6° C*
- *i: Absolute maximum temperature (MAR 1975): 18.0° C*
- *j: Mean daily variance of temperature: 9.0° C*
- *k: Annual interpolation of mean monthly temperatures: Normally between 7 and 8° C*
- *l: Annual interpolation of mean monthly percipitation*
- *m: Arid months (dotted)*
- *n: Humid months (hatched widely)*
- *o: Mean monthly percipitation over 100 mm, reduced 10 times (hatched narrowly)*
- *r: Months with absolute minimum temperatures below 0° C (hatched)*

Figure 18-3: Climatic diagram for Gich Camp in SMNP at 3600 m asl (Hurni 1982)

Vegetation and wildlife

Simen is a mountainous area where unique botanical and zoological combinations of species have been able to resist human interference because of the extreme topography and altitudinal range of the landscape. Particularly worth of mention are the Walya ibex endemic to Simen, the Simen fox (Ethiopian wolf) endemic to Ethiopia, and the vegetation belts typical of Ethiopia, which can be seen in their most extended altitudinal range in succession. A more detailed description of the diffe rent land units and their biology is given in Hurni and Ludi (2000) in Chapters 3 and 6, and in a separate publication (Nievergelt 1998).

Simen is a mountainous area where unique botanical and zoological combinations of species have been able to resist human interference because of the extreme topography and altitudinal range of the landscape.

The Simen Mountains National Park (SMNP)

Based on surveys supported by UNESCO in the 1960s, the Park was delimited and gazetted in 1969, with an assumed area of 225 km^2. Reassessment of the gazetted Park boundaries with GIS analysis, however, showed that the Park area is only 136 km^2, much less than anticipated (see Chapter 19.4 Simen overview map). The Park comprises part of the spectacular escarpment of Simen, with comparatively large areas of natural vegetation and a wide variety of animal species, and includes cultural landscapes both in the highlands as well as in the lowlands. These areas had been settled much before the establishment of the Park, probably many centuries ago. Longterm user rights in the area by local land users are in conflict with the National wildlife conservation policy, mainly because natural resources inside the Park are constantly being diminished despite the establishment of the Park.

Ethnic groups

The population of the Simen Mountains belongs to the Amhara ethnic group. In the lowlands north of Adi Arkay, there are Tigrinya people, and to the east below the escarpment in Beyeda, there are Agaw people of Wag. The Amhara are part of the Semitic-speaking population of Ethiopia. They are mainly sedentary agriculturalists with a mixed farming system based on crop cultivation complemented by a strong livestock component. The main settlement area of the Amhara is the central part of the Ethiopian Highlands: most parts of North Shewa, Wello, Gojam, and Gonder. The Amhara are a minority (about 30 percent) in present-day Ethiopia and have been brought under one single administrative unit, Region 3, as a National Regional State in 1993.

History and religions

The Amhara and Tigrinya groups are sometimes considered synonymous with Ethiopian Orthodox Christianity. In Simen, however, a more complex situation is found. Until about 1990, three different religions co-existed: the Orthodox Christian, the Muslim, and the Felasha (Ethiopian Jews). After 1988, the Felasha of Simen were invited to migrate to Israel, probably based on a secret agreement between the two Governments at that time. It is assumed that the first settlers in the area were Felasha, practising the Jewish faith. Around the 12th century Christianisation took place, which may have originated from Lalibela, the political and cultural centre at that time. In the 16th century some Ethiopian Orthodox Christians were temporarily forced to convert to the Islamic faith in the course of the Muslim conquest of Ethiopia by Mohammed Gragn. However, the majority of the population in Simen reconverted between the 17th and 19th centuries under the influence of the Christian emperors of Gonder (Staehli, 1978), although a number of communities kept the Muslim faith, particularly in the less accessible areas of Simen. For example, in the study area, the ratio of Muslim to Christian people is about 30:70, which is a relatively high proportion of Muslims compared with the rest of Simen.

Farming system

Agriculture in Simen is the predominant occupational sector, with almost 100 percent of the population engaged (outside the towns). The farming system is characterised by complex linkages between the cropping subsystem and the livestock subsystem. In Chapter 5 of Hurni and Ludi (2000), the different land use types prevalent in the study area, the farming system, and its interactions with the natural resources are described in detail.

Institutional characteristics

The Simen area is characterised by a minimum of socio-economic infrastructure and administrative institutions: Few schools, no clinics, few markets of only local character, an economy based mainly on subsistence agriculture, and almost no extension services. The religious systems provide the strongest institutional set-up in the villages, followed by the Kebele Associations (KA). KA structures are a more recent element introduced by the Government on a low intensity level since 1976, and more intensively since 1992.

The most prominent institution in the study area is the Simen Mountains National Park (SMNP). While seen by the Government as a means to implement protection of the Park resources, local inhabitants consider the Park institution as a threat to their existence. Because the inhabitants of a number of villages inside or in the vicinity of the Park were expelled in 1978 and could only return after about eight years, their attitude towards the Park as an institution remained critical in 1994.

Finally, land tenure and titling is delegated to the KA, which is entitled to redistribute land according to the needs of a growing population – if there is sufficient land. As a result, on the one hand, there is no security in individual land holding, but on the other hand, this allows local reallocations which might be needed to achieve sustainable land use in the medium term. This insecurity should thus not only be seen as an impediment to development, but also as an opportunity for sustainable land management and protection of natural resources.

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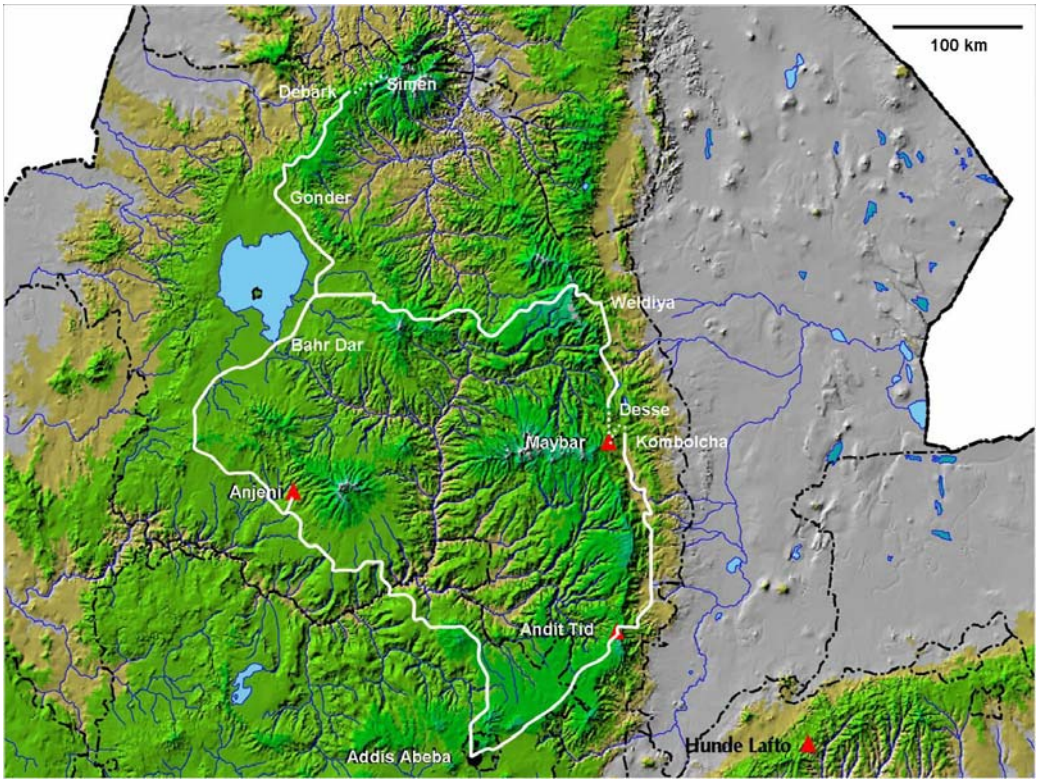
Part V – Daily reports of study tour through Ethiopia

Overview map of the study tour



Addis Abeba and its environs

Tuesday 5 September 2006, Sylvia Lörcher

The first official day of our study tour in Ethiopia began with a meeting up in the seventh floor of the Semen Hotel in Addis Abeba. Assembled around nicely with shiny cloth decorated tables, it was the first time all the study tour participants met. The material such as the reader for the study tour, nametags and maps were handed out to all. Everyone got the chance to introduce him- or herself briefly before talking about the 15 days ahead of us.

The goal of the study tour was to have an inter-cultural exchange, having the advantage of being a mixed study group of Swiss and Ethiopian participants. We should be aware of the possibility learning in situ, in contrary to the normal classroom teaching.

Photo 1: Meeting at Simen Hotel (Photo by Lorenz Roten)

Looking at the Northern Sheet of the map of Ethiopia, the study tour route was discussed. Having the shape of a circle, our trip started at that very moment in Addis Abeba where it would end two weeks later. Moving north-east to Andit Tid and Debre Sina, our two buses would take us to Maybar, Desse and then from Weldiya westwards to Gonder, with a three day trip up to the Simen National Park. From there on, our travel would lead us southward back to Addis Abeba, passing Bahr Dar, Anjeni and Debre Markos. We would pass heights from around 1000 metres up to nearly 4000 metres above see level and all in Amhara Region (see Chapters 12 and 14 for information about the formation of the Administrative Regions in Ethiopia).

After having discussed the coming two weeks, it was time for a lunch break. The ones who still needed to change money into Ethiopian Birr met in front of the Hotel where

our buses were parked to head to a bank. Because most of the administrative work is done manually, it used quite some time until everyone was set up with some Birr's in their pockets. As the buses returned to the Semen Hotel, the group left for the day's planned tour through Addis Abeba. Learning that in 1886, Minilik II established Addis Abeba, we started our city tour passing by the Minilik-Square and driving up to the University campus. The university building used to be the Palace of Haile Selasse. His private dorms can be visited. Driving on to Mount Entoto, we passed many embassies. As the road started to head upwards, the amount of eucalyptus trees increased on both sides of the road. Women were carrying huge bundles of wood on their backs back down towards the city of Addis Abeba.

The wood supply for the people was a problem for Addis Abeba when the city was established. To countervail this problem, Minilik II is said to have imported eucalyptus trees from Australia. These trees are known for their fast growing nature. Most of Mount Entoto is eucalyptus forest nowadays.

Photo 2: On Mount Entoto (Photo by Sylvia Lörcher)

The first church of Addis Abeba is located on top of Mount Entoto. It is composed of stone and many colourful painted wooden boards giving the church the basic form of a circle. Next to the round church building is a little museum holding various pompous gifts donated to the church. Exposed among all the displayed clothes, umbrellas, pictures etc. are two golden medallions of the very successful Ethiopian athletes. The country is very proud of its internationally successful athletes.

Another historical building on top of Mount Entoto next to the little church is the palace of Minilik II. It consists of several white, oval edifices with dark, blackish roofs and tall rooms inside. The palace is accessible for the public and is kept in a good condition considering the humid and warm climate.

Mount Entoto offers next to these historical building also the opportunity of a perfect view over the capital city of Ethiopia. Even though at some places local people charge for the view. Looking down on Addis Abeba, one can see well how the city expanded further into the southern, eastern and western highlands because of Mount Entoto functioning as a natural barrier.

Leaving Mount Entoto behind us, the tour went on to the Holy Trinity Cathedral. This church was built in 1941 by order of Haile Selasse for the holy trinity and the patriots who had helped expel the Italian occupation of Ethiopia 1935-41 (see Chapter 3 for more information about history of Ethiopia).

In front of the cathedral are the four statues of the apostles. Entering the church going down the central aisle one reaches the main copula. Its sidewalls are covered with paintings of Ethiopian artists. The first painting shows the emperor Haile Selasse at the general convention with the Italians. The second painting shows the time after the occupation by the Italians five years later in 1941, when the Ethiopians won back their independence. The last of these three colourful political paintings in the cathedral shows the funeral of the emperor's daughter. Then, looking further up, in the middle of the copula, is the illustration of the purgatory. Behind this painted main copula, only clergymen are allowed to enter the smaller area to warship with god. This area is most of the time shielded by curtains. Being lucky, the curtain got pulled back for a few minutes just when were inside the cathedral.

Getting closer to sunset, the buses with the excursion participants headed back through the traffic across Addis Abeba towards the Mercato, one of the largest markets of Africa. Having lost some time with changing money at lunchtime, there was none left to get out of the buses and visit the market by foot, which would have been unrealistic anyway, considering the size and offerings of the market. Instead the buses fought their way through the crowed streets of the Mercato, giving us an idea of the dimension and organisation of this huge market. It is said that you can buy and sell every imaginable thing here (see Chapters 2 and 4).

This day officially ended back at the Simen Hotel, where most of the participants spent the coming night. This first day had given a perfect chance for having first talks with both, Swiss and Ethiopian students and attendants to start getting to know each other.

Photo 3: Mercato (Photo by Sylvia Lörcher)

From Addis Abeba to the Tarmaber Escarpment

Wednesday 6 September 2006, Berhan Asmame and Gianreto Stuppani

After the Swiss participants had made the acquaintance with the new culture and the friendly Ethiopian people in Addis Abeba, the looked-for excursion begun. At 7 a.m. (according to the Ethiopian time 1 a.m.) we had a rich breakfast at the hotel. Shortly after having stored our baggage in our two vans, including some souvenirs bought by the shopping addicts, the guides gave us the latest instructions about the trip. At 8:15 a.m. we started the "big adventure".

The morning-traffic in the Ethiopian metropolitan was relatively untroubled. It was not as hectic like we are used to from the European cities. Our vans only stopped for road holes, crossovers or when goats or donkeys would cross the street. The sidewalks were more active: Lots of people working in the informal sector offered their services. Repeatedly, we saw children, women and men waiting for buses very disciplined - you would never see such picture in Switzerland. In the background, embassies from the whole world hide behind big walls. They remember us of military fortresses. The Ethiopian capital, at the altitude of 2400 m above sea level, mainly expanded along the five big radiating roads. When leaving the city we saw a lot of newly built houses (see Chapter 4).

Our goal of this first day trip was to arrive at Andit Tid village. It is located approximately 150 km northeast of Addis Ababa, at the altitude of 3200 m above sea level, on a mountain range, which separates the watershed of the Blue Nile and the Awash River. On the way to this place, we crossed a huge plateau who maintains more or less the same altitude. In Sendafa the agro-ecological belt changes. The farmers grow primarily lentils, wheat or beans. Eucalyptus trees, originally from Australia,

dominate the sparse tree population. The farmers live mainly in settlements with scattered buildings. Near Aleltu we made our first stop. We had a look down into the beautiful Kessem Valley. In this area, the farmers are cultivating crops on the steep slopes and some of them are not using enough soil and water conservation measures (see Chapters 1 and 11). Twenty years ago, the cultivation on stair like fields was unknown. Terraces were built due to a government campaign and should protect the soil erosion. The bedrock in this area (also in other parts of Ethiopian Highlands) is Trapp Basalt. On the top, the rocks have polygon forms (see Chapter 6).

Photo 4: View into Kessem Valley (Photo by Samuel Hurni)

At 12:30 a.m. we reached the town Debre Birhan. We ate delicious injera. Because of a fasting day, the ingredients were made up of different vegetables. During the lunch it started raining. The rainy season was not finished yet.

Finally, we ended up in Andit Tid area. There we pitched our tents on the edge of the escarpment. The view from our camp down to the Awash Valley was stunning! Our cams got hot... We looked at a hilly scenery with lot of round huts, green fields and forests. No sooner have we pitched our tents than we got surrounded by young curious herders. They had probably never seen campers before.

We split into small groups and then did a journey around Andit Tid catchment (one tid in Amharic). This was one research catchment of the Soil Conservation Research Programme, established in 1982 (see Chapter 16). The area is heavily affected by soil erosion. But the farmers are practicing soil and water conservation measures in the area

in order to protect the area from soil erosion. A hike up to the close sparsely planted mountains showed us that even in an altitude of 3500 metres it is possible to cultivate cereals. But in these heights, frosty nights limit cultivation. Above the research station we have seen enormous soil erosion damage. The slumps, heavy rainfalls and the dusk made the way to the station difficult to pass. Arriving at the research station, we could enjoy hot tea, minestrone, lamp and pasta. We were tested by stormy winds and wet-cool weather, in particular most of our Ethiopian colleagues, who spent their first time in a tent. But we all survived!

The lowlands between Debre Sina and Kombolcha

Thursday 7 September 2006, Elias Fekade and Lorenz Roten

We all have been wondering since quite a while how may teff, the gluten-free grain, indigenous to Ethiopia and more and more wanted in the whole world, would look like. Today is our chance, today is teff day. As we descend from Andit Tid research station in the highland down to the lowlands, we will pass from High Dega through Dega to Weyna Dega. Only the latter provides the climatic conditions needed for this precious grain to grow. While it is still possible to cultivate wheat in Dega, in High Dega only barley can be grown, due to the frost problem.

Before we drive off, we discuss our observations of yesterday's walk from the campsite to the research station. Why did we only find grasses in the upper valley, when the altitude and morphology would also allow barley to grow? Either an end moraine or a possible landslide has blocked water, rendering the soil too humid to grow any crop. And why did we encounter numerous terraces, but we could not find any barley growing in them? In order to protect the land in this altitude from high erosion during rainy seasons, only the small, and therefore less erosive, rainy season Belg is used to grow crop (see Chapters 1, 6, 9 11 and 16).

In his subsequent presentation, Eddy underlines the importance of soil splash and water erosion, especially during the most erosive month of July. Deforestation aggravates the consequences. Even though the mechanical components of soil conservation, the technical measures and its solutions are supposedly well-known and quite simple to understand and implement, the challenge remains always the economical pressure coming along with erosion-control – simply less crop production. Despite the awareness on both, governmental and farmer side, a certain political arrogance led to poor communication, general and rigorous implementation of uniform measures (terraces were considered as the one and only solution, regardless of altitude, soil, crop or agricultural technique used), lacking individual planning and resulting in a wrecked confidence and a yet more delicate situation (see Chapter 11).

As far as the local soil here in Andit Tid is concerned, Heinz determined it to be Andosol – a mix of volcanic ashes and basalt. Andosol can store a high amount of water and a lot of organic material. Under natural conditions (covered with vegetation) it remains stable. Since there was no vegetation at this altitude during the last ice age, the oldest possible age for this soil could be 10-11000 years (see Chapter 6).

Soil erosion data is expressed in tons per hectare and year. If rain wears away 1 millimetre of soil over an area of 1 hectare, it equals a loss of ten tons of soil. For these areas here, test plots with a slope of ten percent have shown an average soil erosion of scary 210 tons per year and hectare. For slopes of more than 30 percent it seems therefore rather difficult to find technical or empirical solutions to prevent erosion in a reasonable manner. In fact, the question raises if agriculture does have a future in such areas at all, and what the development options would be. The following bus ride made an additional statement to the figures. We really saw heavy soil erosion everywhere, cutting even across terraces. But what alternatives are there? Lumber and commercial forest?

In order to understand more about soil erosion in Ethiopia, the Swiss Agency for Development and Cooperation (SDC) has granted money in 1981 to operate research stations during 17 years (see Chapter 16). In 1998, the CDE hoped to pass on the stations to the government of Ethiopia, which would continue to collect precious long-term data. As the central government turned this chance down, Amhara Region was interested in keeping its stations.

Overlooking Debre Sina and surroundings, we could easily distinguish between original and planted forest, the so called „African montane“. There are many deforested areas and cleared fields on the way, properly illustrating the problem of overuse of the landscape and its consequences. In the busy main square of the city then, you could find it hard to turn down the two yellowish local liquors, made of Kosso’ (hagenia abyssinica). This plant, endemic to Ethiopia, is supposed to be a good medicine for intestinal tape worm infection.

Shortly after passing through Debre Sina, the highland-lowland transition is very apparent. The road is becoming much better, soils are changing and the dominant crop now is corn and Sorghum. And we finally spotted our first teff after Addis Abeba.

Teff does not contain gluten and is therefore highly digestible and ideal for persons allergic to the gluten protein (celiac disease). Teff’s richness in minerals such as iron and calcium explains the positive effect on blood production. Teff is resistant to diseases and since the grain is very small, the seed for a whole field can be carried by one person. To even more outclass other crop, teff can easily be stored for several years. No wonder that teff is now more and more demanded in other countries and its booming export let the prices soar.

So why not grow exclusively teff as the economical way of thinking would suggest? First, teff yields are very low, and there must be a trade-off with ecological thinking.

The shallow roots cannot well stabilise the soil, they need more moisture and ploughing from 5 to 6 times a crop. This, combined with seeding late in the rainy season, clearly facilitates soil erosion. To choose not to grow teff on slopes actually already could be considered a soil erosion preventive measure.

An intelligent solution seems to be applying the technique of intercropping, meaning to simultaneously grow two different crops on the same field, such as teff and corn for example. The big plant and its late maturation enhance the land cover which diminishes erosion. Well combined with the right teff seed (there are innumerable different types, suitable for different conditions, red, white, early maturity, late maturity...) a positive effect on soil erosion should be obtained. These combinations have yet to be studied (if anybody is interested in a diploma topic...). But the ample local differences, starting by using different seed, underline once again the importance of including local knowledge in planning measures, rather than generally implement and focus on merely building terraces for example.

Nearby we discover some recent landslides. They were shown in the news recently since they have caused some casualties. Supposedly landslides are not a problem here, but Heinz classifies it as a common event in trapp-basalt landscapes, such as this one. We can only speculate if it was the geological stratification, changing rainfall patterns or something else that triggered the slide.

The refreshing papaya-avocado drink at the local juice house in Shewa Robit, the appearing Muslim mosques, the higher plants and the blooming flowers convince us to have arrived in near-lowland conditions. We stop at the border of submerged seasonal grazing land. During dry season this field functions regularly as grazing land, whereas during wet season it is submerged, containing even fish.

On our last stop we are supposed to be looking at another lake. We are unable to detect any water though. The cause: a man-made mistake.

A dam seems to be an ideal solution to capture excess water from the highlands and distribute it in the water-needy lowlands. In order to build a sustainable dam, two essential parameters must be fulfilled: there must be enough water and little sedimentation. Two million Birr have been invested here in a dam, whose reservoir was nurtured by sediment laden water. The sedimentation amount was such that it was only a matter of months to completely fill it up to the point where not even the dam is visible anymore. This is another unfortunate example of implementing measures without scientific assessment. Effective watershed management needs involvement of research and a better understanding of highland-lowland interaction. Next overnight stop: Kombolcha.

Trekking from Kombolcha to Maybar

Friday 8 September 2006, Kaspar Hurni

The plan fort the day was to reach Maybar from Kombolcha on foot. Maybar is another research station of the Soil Conservation Research Programme (see Chapter 16). After a delicious and strengthening breakfast (we had 'ful') the first difficult decision of the day had to be taken: What to pack for the trip… On the one hand we were going to have a walk of approximately 20 km and additionally a couple of metres in altitude, so we didn't want to carry too much. But on the other hand, it was still rainy season and coming to Maybar with totally wet clothes was not in our intention. Remembering the night in Andit Tid, where it only rained once, we then decided to rather carry a little bit more (raincoat, umbrella, etc.) but at least not having to arrive wet in Maybar. Later on this decision showed itself as a letdown – we had gorgeous weather the whole day. Instead of the rain we rather got wet from sweating – it was quite hot and we had a huge load of luggage to carry…

After eating and packing there was quite a rush in the small city: All the excursion participants were trying to find some snacks for the lunch-stop on the way. There were a lot of small shops and we found delicious bread, cakes, cookies and fruits (see Chapter 2). As everybody made sure to not be hungry on the way it was time to get started. After a group photo we finally got on our way to Maybar around half past nine. We started our walk at an altitude of approximately 1700 m asl with nice weather conditions. The sun was shining and thanks to previous rain the air was clear and cool. As Maybar lies on approximately 2500 m asl the way soon started to go upwards. Together with the sun reaching for the zenith and the erroneous packed backpack the trekking seemed to become the first bigger physical effort of the excursion.

On our way up we had the chance to cross the agro-ecological belt called Weyna Dega and to witness different land use and conservation practices, but also to see problems concerning erosion and degradation (see Chapters 1 and 11). At a rather steep slope with a river we observed there were a couple of stone terraces. In case of a higher runoff they should prevent the river from eroding deeper and upwards the slope. Most of the land we crossed on our way was agriculturally used. Either there was some crop growing on it or it was used as grazing land. Much of it seemed to be under heavy use, as some of the fields seemed degraded and many areas looked overgrazed.

Photo 5: Riverbed with erosion prevention (Photo by Kaspar Hurni)

Photo 6: Overgrazed land (Photo by Kaspar Hurni)

Before lunch we stopped at a point with a nice view and listened to the presentations of Veronika Elgart, Franziska Grossenbacher and Sisay Demeku about the agro-ecological belts and the climate levels (see Chapters 1, 8 and 9). At that point we were at an altitude of approximately 2000 m asl and thus in the middle of the Weyna Dega. The crops grown in this zone normally reach from teff (around 60 to 70 percent), maize and wheat to pulses. The growing period is around three months from early July to the end of September, and the big challenge is to match the rainy season (Kremt). Due to its variability in time and quantity it is hard for the farmers to find the right crops and time to sew.

Concerning the vegetation we tried to figure out what the natural vegetation would look like. As this area has already a long cultivation history this was difficult to define exactly. The easiest way was to relate the natural vegetation to the altitude and then try to find some single species that could indicate the natural vegetation. At 2000 m asl we were in the montane forest zone, which includes trees from the acacia species, juniperus and ficus. Some of them could be located in the surrounding landscape (see Chapter 8).

After lunch we continued the trip in smaller groups, so that everybody could walk with individual speed. The next couple of hours of the trip was a mixture of passing by nice viewpoints, crossing quite dense forests and different fields, seeing conservation practices, and trying to keep the shoes dry on the sometimes muddy way. As by the end of September the rainy season is going to be over soon, we also had the chance to see different types of water harvesting techniques. One example is on the image below where they built a pond for water storage.

Photo 7: Gully near Kombolcha (Photo by Kaspar Hurni)

Photo 8: Dense forest (Photo by Kaspar Hurni)

Photo 9: Water harvesting pond (Photo by Kaspar Hurni)

Towards the evening we finally reached the research station of Maybar. The decision to establish a research station in this area was taken in 1981. The catchment of Maybar seemed to be appropriate to identify the ongoing processes affecting the hill chains, the slope lines and the lower areas with farmland and the rivers and lakes. Additionally the catchment of Maybar is a marvellous place.

Luckily we had the chance to arrive in Maybar together with Sisay Demeku, who wrote his MSc thesis there. On the walk down from the hill chain to the station he gave us an introduction to some of the conservation practices and measurements that were introduced in 1983 and maintained since then.

When we arrived at the station we were welcomed by Ali Ahmed, Anna Coendet, Ivo Strahm and a couple of other people who worked there. They had already slaughtered a sheep for dinner and we could enjoy the late afternoon by having a rest and looking forward to the nice dinner. Step by step the other groups dropped into the station, too, and soon the whole group was reunited. After pitching the tents, which had been transported by a car, we had a gorgeous dinner and passed the evening with conversations and enjoying the nice full moon. Bedtime was quite early, as everybody was tired from the long march.

Around Lake Maybar

Saturday 9 September 2006, Andreas Obrecht and Ivo Strahm

After a nice breakfast, Sylvia Lörcher and Daniel Loppacher introduced their chapter "Agriculture and Rural Setting" (see Chapter 1). This issue was chosen because we found ourselves now in the middle of a rural area. They emphasised the importance of agriculture in Ethiopia and illuminated the problems connected to the land ownership system. Later, Eduardo talked about Sustainable Land Management (SLM) (see Chapter 11).

Roughly 80 percent of all Ethiopians work in the primary sector. Here we can meet the biggest livestock population in Africa. Because of the high pressure on land due to the high population density in this area, an aim in this sector is to narrow the gap between actual and potential yield. This should be achieved by using better seeds and more fertiliser. But, new seeds and the application of fertiliser need a lot of management the farmers do not yet know. Therefore this approach is also criticised as to be only technological. Up to now, production was mainly raised at the expense of more land.

Traditionally in Ethiopia, land can not be owned; land can only be used. Land is seen as a gift for mankind. Before the land reform of 1974, there were three locally different tenure systems. During the land reform, land was redistributed. The goal of the reform was to secure production to all peasants, and even make export revenues, which should directly go to the government. This ended the feudal system. Every family was

expected to get at least 10 ha of land. Lease, change and selling of land were prohibited. Additionally, there were no more taxes on the land. Landless peasants profited the most from these reforms. Nomads were also benefiting. But in reality, every family had only 2 ha land – 10 ha was never reached because there was not enough land in most parts of the country. In rural areas food supply was improved, but in cities the situation became worse. In 1977 the Derg raised taxes again.

Photo 10: Lake Maybar (Photo by Brigitte Portner)

Comments made by participants

- The major problems of agriculture in Ethiopia are: rain dependency, high cost of fertiliser, difficulty of soil conservation, population growth, and therefore, pressure on land.
- There is no private land ownership. It is not defined how long one can use the land because nobody knows when the next land reform will come. As long as a farmer does not own his land, he cannot be expected to invest in his land. Nevertheless, this does not prevent some farmers from maintaining their land. On the negative side, private land ownership would lead to disparities between rich and poor farmers because of the tenure system.
- In terms of land the average land holding in Ethiopia is 0.5 ha per household; in Maybar we have 0.75 ha per household.
- Implementation of fertiliser: First the same fertiliser was recommended for every type of land. Nowadays it is recommended according to the different plants and soil types. There is an additional problem with fertiliser. When there is a

shortage of rain it may dry out the soil. Second, yield increases may not suffice to cover the costs of fertiliser.

- There is no private land ownership and also the water ownership is not regulated. These privatisations could have an effect on family planning. The restrictions would force the farmers to keep the size of the families corresponding to their land size.
- 80 percent of the whole population of 71 millions people are farmers, and they are not allowed to decide on their own. What about responsibility? There is a big loss of knowledge because the state is organising everything. Does a farmer know how to develop its farm? How can the government give back responsibility?
- Natural resources: water and runoff controlling: terraces, improve of infiltration, control of runoff. The effect is a reduction in soil degradation. How to improve infiltration? Plants do enhance infiltration. Soil burning (burning of dung and other organic matters) increases infiltration but decreases the organic matter in the soil.
- Agriculture is essential for the secondary sector. This can be expected to persist for the near future. The Ministry of Agriculture has taken the responsibility for the land and they have not taken in account the knowledge of the farmers. They will never be able to comply with the diversity of the land. This has been the case for decades. But now there are more participatory approaches. But even in universities the topics are mainly technical.

About the Soil Conservation Research Programme (SCRP) (see Chapter 16)

There was and still is a lot of data collection in Ethiopia and also in Maybar Research Station. The programme was established in 1981 and the aim was to get more information about soil erosion in the highlands, where all rainfed agriculture is situated. That is why there are no research stations in the lowlands and in very steep areas. No data collection was made concerning agricultural development, such as fertiliser or different plants. The overall aim was to get information about location, time and amount of erosion, and about technologies and approaches of soil and water conservation. There were several Master and PhD theses done in this area. A big question was the problem of measuring soil erosion and the different impacts causing soil erosion. The research setting contains the following measurement categories:

Land use and crop production (see Chapter 1)

There are two **land use maps** for the first and the second crop made for every year. Additionally, the **yield** of different fields is measured for every harvesting time. For some years even the **vegetation cover density** was recorded.

Soil erosion and soil and water conservation (see Chapters 11 and 16)

At the River Station (Hydrometric Station) the **sediment yield** during erosive rainfall events is measured. Supplementary a limnigraph continuously records the **water level**

at the outlet of the catchment during 24 hours. **Soil loss** is also measured on test plots (2m x 15m) and was measured on micro (1m x 3m) and experimental plots (6m x 30m: compared plots with and without soil conservation measures; result: there is no big difference between the different terrace building techniques, but it is always better to construct terraces than do agriculture without. The best fitting technique to the particular land use system should be chosen).

Social and economic data

For several years: **demographic data** such as population size, age and sex structure, age and sex of household head as well as **socioeconomic data** such as livestock type, herd size and number of oxen per family were gathered at irregular intervals and with the use of a random sampling technique.

These data collection was supposed to give answer to different basic questions, e.g. whether there can be seen a change in the data after impacts such as the implementation of soil and water conservation measures or of political changes during time. Maybar (or the whole SCRP) can be considered as a long time monitoring. After 17 years of support the Swiss involvement finished and the stations were handed over to the Ethiopian State (the different regions were now responsible for the data collection). Up to now the stations are run but there is only little or no evaluation of the data. This database may be one of the most detailed in whole Africa.

Discussions with local farmers

This discussion took place on a hillside with view on Lake Maybar.

Is there fishing being done on the lake? The fish is for personal consumption only. We don't sell any fish at the market. There is a Fishing Association, which owns a boat for fishing on the lake.

How much does the lake level differ? It changes about ten metres in horizontal distance between dry and wet season.

How do you perceive land degradation? It's clearly affecting our lives. Our area is surrounded by mountains. The size of land is very small and the grazing area is getting smaller and smaller. It's not suitable for grazing. We're using it intensively because there is no alternative. Hans Hurni has done a lot for us, the local population - he has proposed a method to irrigate land. The land degradation puts the future in danger.

Do you realise a decrease in production every year? Yes (the long-term data shows the contrary).

Photo 11: Discussions with farmers in Maybar (Photo by Karl Herweg)

What alternative do you propose? It could be possible to find plants which at the same time feed animals and conserve the soils. Terraces protect the area from degeneration, but at the same time reduce productive land. The plants on the terraces show good production. The terraces have a double function.

Is there some measure farmers would prefer on the terraces? No alternative is better than the terraces. In some areas terraces have disadvantages like rats which are eating crop. The problem is not very common everywhere. We managed to construct only small terraces and so limit the bad effects.

Have you observed some changes in the lake? As a result of the erosion the sediments end up in the lake. The depth must have decreased some years ago; the deepest point was around 33m. Today we have a depth range from around 27m up to 14m.

We had terrace construction here during the last three regimes, but there was no participation; is this true? All the land was privately owned during Haile Selasse's time. On the steep slopes, there was dense forest. Before the change to the Derg Regime took place, the local peasants deforested the hills. They feared someone else to take the wood. Then the Derg regime closed steep areas and did a lot of reforestation. During this time guards watched the forest. Meanwhile we were running out of grazing land. The people were totally excluded of using the hills Afterwards the farmers cleaned the forests again. Once the forest was destroyed, the bad effect was seen by the farmers. As a result of cultivation of the very steep slopes we were not even able to graze the cattle up there.

Why did you do the mistake for the second time to cut down the forest on the hills (first time after Haile Selasse, second time after the Derg)? Now it is a different generation, and there are more people. Besides this we try to avoid past mistakes and do all the best to work sustainable. During the Derg time measures were not supported by peasants because they could not participate in the implementation process.

Are you able to bring some harvest to the market? Yes: Kombolcha and Desse. But we do not sell a lot. The annual yield is more or less for their own households. Occasionally there is exchange among the farmers.

Is market access a problem? No, this is not the essential problem.

Do you produce handicrafts or sheep wool? No. There is no tradition.

Why not? No experience, we are not used to it.

What would be the potential of this land with or without terraces? The terraces are essential for the land not being degraded. There is a slight reduction of profit, but we know the advantages of the terraces.

Are the children staying here or are they migrating? After their school, most of the children are going away to have jobs. Only five percent stay here and work as farmers.

What kind of jobs can the migrated people conduct? Lots of jobs like policeman, teacher, etc.

Are children allowed to decide what kind of job they want to learn or are they forced to become something what the parents want them to do? It's like in Europe. The family tries to teach their children that life as a farmer does not pay out. The job depends on their performance.

Do the kids sometimes come back? One of the interviewed peasants serves as example. He is without a job and has finished grade 11 at school. Now he does not want to work on the fields anymore. He likes to work in an office. This situation leads

to problems and tensions within his family because they want him to work on the fields. Everybody now wants to work in an office.

About 25 years of research are being conducted here. Many people come and go. Did the projects bring something? What is your opinion? We have learnt about soil and water conservation. Since Hans came, we have learnt a lot. [*They mention especially the generators and water pump. Karl insists on a better answer as the pump is not the result of the research*.] Personal awareness is the best benefit for us. The measures have provided us with information about our land. According to this awareness, we are constructing terraces.

Were you able to increase productivity? Yes.

How does the information from the research get to the farmers? We were observing what the researchers were doing. They also instructed the surrounding farmers.

What do you think about us and the Europeans / foreigners? The Europeans have a better way of life and better living condition in many terms. You are in a better position. So you can do more research and care better about the environment. I wish that the Ethiopian people will also reach this position.

Do you wish to go to Europe? Normally we love to live in this area but the conditions should be better. If the conditions don't improve we will be forced to leave the area. Education is the main point.

You went to school for twelve years, but you have no job opportunity; what should improve? I can do any office job.

Is it normal for kids here to join school for twelve years? You have to complete ten years. It depends on the wealth of the families.

Is the land equally distributed in terms of steepness of the slopes? After the establishment of the water pump, the land was distributed equally.

How about tourism? This could be an alternative.

You consider it desirable to get visitors? No problem, but the area needs more conservation or facilities.

So, are there plans to increase tourism? With the Wereda Administration there are plans to construct facilities at the lake.

Then the farmers were invited to ask us questions.

If Hans would not have brought the water pump, there would maybe not be any life here. Big famines happened in this area. We pray for his long life and want to see him. The pump does not have its own operator and now (!) there is a technical problem. There are replacement elements missing. The other problem is electricity. Maybar is not yet connected. We would be very grateful if there would be electricity so that the children can study at night since they are working by night. (…)

After this interesting discussion we visited the water level measurement device. Ali showed us how it works. Meanwhile Seid Belay was taking a water sample to dry it and measure the mechanical components. In the afternoon we visited the other measurement arrangements in Maybar. First Karl explained us the climatic station.

Climatic Station

The **temperature** is measured daily at a height of 2m (air temperature) and 0.05m (surface temperature).

Photo 12: Clima measuring instruments of Maybar Research Station (Photo by Andreas Obrecht)

The **evaporation** is measured twice a day (8am and 6pm) at a height of 2m.

The **wind** direction is measured with a thread fixed on a nail at a height of 1m (twice a day: 8am and 6pm). The wind strength is estimated according to the movement of leaves up to the breaking of tree branches.

With a recorder the duration of **sunshine** was measured (for at least one year).

With a pluviometre the **rainfall** is recorded. The inclinometre (four inclined rain gauges in all compass directions) records the direction of the rainfall. These two instruments are supplemented with daily rain gauges (there are two of three remaining).

Afterwards we visited the test plots where Karl explained the measurement technique and the different difficulties they were confronted with during the establishment period and the data evaluation.

Further on, we had a look at some test terraces (test plots) where we saw different types of grass strips:

The ditches have to be built according to the climatic zones. If the area is wet, the ditches need to have a gradient with slope up to four percent. If it is semi-arid, the ditches have to be built along the contour. Here six experimental plots were built. One plot covers around six metres. The terraces are built with different methods, basically in three ways: Stonewalls, ditches with the material being deposited uphill, ditches with the material deposited downhill.

On the way to down to the lake, we got a nice view on a soil profile: Heinz Veit made some comments on it.

Soils (according to comments made by Heinz Veit)

A big and black layer lies directly on the rock. In the FAO-Classification this kind of soil is named Phaeozem. Phaeozemes are dark brown or grey having high humus content. They are highly arable and can be used for both cropping and pasturing. We find Phaeozemes mainly in Steppes. But if we consider the genetic aspects of that kind of soil this classification is not correct. The covering sediment is probably 10`000 years old and may be a colluvium dating from around 10’000 years ago when the glacial border was 1000m lower and there were no trees here. It covers a saprolith (→ in situ, heavy weathered Trap basalt in the original form so that the original structure can still be seen) that maybe aged to 100`000 years BP but could be much older. We have a big time gap between the rock and the sediment. For trees it’s possible to grow on saprolith. The rock itself has a high fertility. Soils on volcanic rocks are the best in the tropics. The high KAK is related only to the fine material but here we have quite many stones. The soil can not be classified as a Pheaeozeme because the continental climate influence in the soil can not be figured out.

If the upper layer is not a Phaeozeme soil, what is it then? We classified it as an Andisol or a Vertisol. How can we tell the difference between Vertisols, which are developed out of basaltic rock, and the Andisols which are developed out of volcanic ashes? Both appear black, the same. They have a certain clay content and can store water. If it was a Vertisol, sediments would fall in cracks during dry season. This is called perturbation. Top organic material is moved down. The swelling and shrinking is

typical for them. This soil here would not do that. Additionally, Vertisols can rather be found in flat areas. What about the Andisol then? In Andit Tit we have seen that most of the sediments are volcanic glasses. It is enriched with clay → Allophanes. In Maybar the soil has a high density – less than Andisols usually have. It is neither a Vertisol nor a Andisol. The question remained open.

At the end of this very long day, we visited the new dam at the outlet of the lake and also the Maybar catchment.

The dam story

Ivo Strahm and Sisay Demeku have both been assessing the hydrological potential of the lake. There are some questions concerning an eventual dam of four metres height. The basic idea is to improve the water storage capacity of the lake. This increased amount of stored water would allow the lowland farmers to improve irrigation of their fields during dry season. Anna Coendet, a Swiss student of Social Anthropology, is studying the implications of this project for the local economy and society. A big issue is the planned compensation of the highland farmers by the lowland farmers for their land loss due to the higher water level.

Now, when Anna Coendet and Ivo Strahm arrived they already encountered a dam. This dam is lower than the planned one, but nevertheless the lake level rose. But there was no participation by the people and no compensation planned. The people in charge of this new dam are out of power already.

The pump story

Another topic we debated was the pump mentioned above. This pump has been installed by SCRP in the drought season of 1984. It helped the local people to survive in this area during this period. Maybar was the only place in the region where nobody died because of hunger. But – this pump was used only in spring 1985. Since that time, nobody felt responsible for it because there was no more drought. Now, there are plans to use the pump every year during dry seasons. But this plan exists already since the end of the 1980ies. In 2004 Helvetas paid some money to revise the pump. This only under condition that the farmers learn how to handle it by themselves and that they establish a water user association. But this proved to be very difficult. Farmers often do not know if the next harvesting period will provide enough yield for their families. The farmers are afraid of diseases in cash crops anyway. There is no technician for the pump available. Therefore the farmers do not easily take a risk because if they lose one yield they will have a very hard year.

Trekking from Maybar to Desse

Sunday 10 September 2006, Melese Tesfaye and Stefan Salzmann

While taking sun protection cream in the morning before walking from Maybar to Desse, some Swiss students were asked why they were using this white cream. How to explain an Ethiopian soil and water engineering student, what the usage of sun cream is? The Swiss tried it like geographers: white (or yellow?) Swiss skin will rapidly degrade in the strong African sun, so using sun cream is a protection against skin-erosion. In this context we can speak about SSM: Sustainable Skin Management. After that, the point had been understood.

That day was the eve of Ethiopian New Year. It seemed bad for the Ethiopian colleagues to be outside and far from home at this moment. Not only were the Swiss but also the Ethiopian colleagues really curious about the way of celebrating this old day of the year in Desse. We are walking towards that….

After 45 minutes walking up the hill of Maybar catchments (Tadele Amare like Haile GebreSelasse was the first on the top without seeing it☺), we had a last view over Lake Maybar, which gets filled from the catchments and the surrounding hills. From there, we followed an unpaved road down to the valley towards Desse. This road was in good conditions but partly destroyed by rainfall and the only vehicles which were able to drive here were four-wheel-drive Jeeps and trucks. Cars, taxis or public busses would be stopped in mud-holes, so private transport was almost impossible. This could happen to any unpaved road during a rainy season, and reconstructions are needed every year, or else, people have to go on foot until the road dries out. Paved roads would help to solve these problems, but it is more expensive to build them, and until today, only the minor part of the Ethiopian street-net is paved. We said a lot about transportation as it was on of the day's topic (see Chapter 4), according to the order from Ato Amare, sorry!

We rested for a while to discuss the topics: Already on the walk we had intensive discussions about transportation, institutions and politics (see Chapters 4, 14 and 15). As in other discussions about similar themes, a big difference in the way of thinking between Swiss and Ethiopian students could be observed. Swiss people preferred to have optimistic views and were always trying to look for possible improvements, no matter if they were realistic or not. Ethiopians preferred to think about things where changes were possible. That's why many of them were tired to talk about politics although improvements were wished but beyond their power. One sentence was addressed to explain this difference best, which made us thinking and understanding at the same time: '*You (Swiss) are lucky, you were grown up with the knowledge that one person could change everything. We (Ethiopians) were grown up with the certainty that we need one million people to change something.'*

Photo 13: The road to Desse (Photo by Stefan Zingg)

We arrived in Desse in the late afternoon after some 25km of walking over hills and mountains.

We prepared for the Ethiopian New Year's Eve according to the Ethiopian Calendar, thirteen months, on the 10th of September of the European Calendar. The conventional way of celebrating the eve in Ethiopia is that the children sing a song going to everybody's house and say goodbye to the old year. In response to that, the household would give them bread and something to drink, and money that is meant for this case. At the evening of eve most of the time the male children are expected to do that, and then tomorrow it is going to be females to do the same, but with opposite sayings, "Happy New Year" and give flower to households wishing the best to them and in response to that, they will get the same as today's. Curious to see that… Excuse us that this is not part of our today's report but it is to connect with the moment.

Before dinner we had a short walk through Desse. Some Swiss students bought themselves a gabi, cloth to use in cold time, (by the way, Gabi is a female nickname in Switzerland!) with nice assistance from the Ethiopian counterparts. During trying, trading and buying (Stefan was looking and listening from outside), the former street boy Kidanu started talking to him. When he was five years old, his parents died and he started living in the streets of Desse for a few years. Then, he could live in the house of

the friend of his father, and he had the chance that this family sent him to school. This showed Stefan a possibility, how a social network takes care about people if there is no governmental care system as in Switzerland. And at the same time, it made him thinking about many other similar destinies which won't end as happy as the example of Kidanu! A lot of people living outside in the streets, no matter which city we visited, brought this problem back to our minds. Even far away from their families, the Ethiopian Students of our group, and we with them, celebrated that night, the change from 1998 to 1999. The Swiss tried to act as their families as good as it got. Stefan, for example did (or let do) the first shoe shining in his life. What seems to be something normal in an Ethiopian view felt very special in his Swiss perspective, but finally he went out in the evening without Maybar-soil on his trekking boots.

We had a good night in some hotels with a lot of drinks and had fun, but many of us were too tired to enjoy.

Good Night Everybody and Happy New Year to all Ethiopians!!

New Year in Desse and onwards to Weldiya

Monday 11 September 2006, Michael Rüegsegger

Photo 14: Coffee preparation. Sisay Demeku wears the traditional Ethiopian costume (Photo by Michael Rüegsegger)

On this morning, everybody wished each other a happy new year. Happy new year? It is the 11th of September! In contrast to our calendar, the Ethiopian calendar begins on this day and is based on the older Alexandrian or Coptic calendar. That we celebrated together with our Ethiopian friends on New Years Eve was a matter of course, in spite of the different calendars.

Our group met at the Restaurant Kalkidan at nine o'clock in the morning and started our daily schedule with a traditional coffee ceremony, which is usually conducted by a young woman. The coffee beans are roasted in a flat pan over a small charcoal stove. The roasted coffee beans are ground by a mortar and a pestle and slowly stirred into the coffee pot called *jebena.* The finished coffee is served in a tiny china cup. The coffee is usually offered with traditional snack food, such as peanuts, cooked barley or, in our case, popcorn. Furthermore there was a loaf of bread, which is normally cut by a elder or religious man (see Chapter 3). Although it is impolite to leave the ceremony until the consumption of at least three cups, because the third round is considered to bestow a blessing, we left the restaurant after the first cup and continued with our day's program.

The next meeting point was the courtyard of our hotel, around eleven o'clock, where we put our luggage in the busses. Then we started in the direction of Hayk. On the way we passed an area where the slopes were reforested with Eucalyptus, Acacia and Cypress trees by the government in 1978.

Our first stop was next to Lake Hayk, one of the highland lakes of Ethiopia, located 20km northeast of the town of Desse. Pollen analysis of a sediment core from Lake Hayk shows vegetation changes in this area during the last 3000 years. The natural, pre-disturbance vegetation of the area was a coniferous forest vegetation consisting of Podocarpus and Juniper. At around 500 BC, the forest was deforested and replaced by secondary bushland vegetation. The presence of Ricinus, often found as a weed around settlements and agricultural fields, and the decline of Olea and Dodonea, an indicator for secondary bushland, suggests that farming people moved into the Hayk Region at around 500 BC and cleared extensive areas of montane forest and bushland to provide grazing for domestic animals. By reason of intensified forest clearance after AD 900, the Podocarpus-Juniper forest had almost disappeared from the region by AD 1200 and was replaced by grasses, which indicates a further intensification of land use by grazing animals. Between AD 1400 and 1700, the pollen analysis shows a forest regeneration possibly due to drought-induced depopulation followed by increased rainfall. The last three centuries were dominated by conversion of forest to bushland and grassland. Human impact is the main reason for this vegetation change. Today we can find different tree species, such as Acacia, Juniper, Cypress and Rhododendron (see Chapters 8 and 10).

We left Hayk and drove further north to Wirgesa. Our focus was lying on the big alluvial fans near the town. Until 1938 the area was covered more or less by natural vegetation, especially dense forest, and a wildlife habitat. People lived in the valley floor and agricultural practices were limited to the bottom and flat sloping area. The interaction of radical deforestation followed by a heavy rainy season were the

beginning of accumulation of the alluvial fan. Several forced resettlement measures because of land tenure rearrangement by the Italians 1939-1945 and by the Ethiopian Government in 1949 displaced farmers to upper areas. The result was deforestation of hillsides and steep slopes to generate new agricultural cropland and in consequence of deforestation an increased soil erosion (see Chapter 17).

In 1975 the Derg-Regime ordered soil conservation and aforestation which decelerated degradation. In the very steep areas, there are farmers but the soil and water conservation activities are rare. The aim of the Government is to remove those people from these areas.

Until now the fan has a size of 105 hectares, resulting an annual increase of 1.5 hectares. The fan is covered by debris and boulders from the upslope area. It is important to note that the rate of fan expansion after 1986 was very little compared to the preceding years.

For further information please read in the chapter "special themes": "Wirgesa and its environs: land use and land management dynamics" written by Amare Bantider.

Photo 15: Gotu-Gully (Photo by Michael Rüegsegger)

A few kilometres further, we stopped at the main road and walked to a gully. Its current depth is around ten metres, and it was formed since 1950. Erosive storms after long dry periods are said to be the major cause of gully development. The soil a half a metre above the paleo-soil was dated to 30'000 years BP, which indicates an annual

accumulation rate of 0,003 cm/yr. The soil mainly came from the mountain slope through erosion.

Gullies are threatening agriculture. There are several ways to protect the agricultural areas next to the gully:

Right in front of the photo we can see a plant which is a good stabiliser to fix the sidewall and to reduce erosion.

A Paleo-question: We could observe three soil layers on the sidewall. The upper and the lower layer seem to be similar. We guessed similar paleo-climatic conditions. But why is the layer between them different? It is difficult to answer this question only by having a look at the layer, but Heinz Veit supposed drier conditions during this time.

Our next stop was at agricultural testing plots near Weldiya. Our Ethiopian friends Sisay Demeku and Tewodros Assefa investigated different cultivation techniques. They prepared three fields in different ways and sowed teff seeds on each of them. The plots were prepared as follows:

- Trampled one: The plot was ploughed and trampled before and trampled by animals after sowing.
- Levelled one: The plot was levelled. After levelling, the seeds were sowed. No soil compaction.
- Without preparation: This plot was neither trampled nor levelled.

It is interesting that, in spite of varying methods, there are no big differences in yields. Only the one without preparation has a lower yield. The different methods have a greater influence on germination. The trampled one has the best germination and the plot without preparation has the worst germination. Furthermore the trampled one has the largest runoff and sediment loss.

Our last short stop was at the Srinka Agricultural Research Centre. Their aim is development in agricultural purposes, such as crop breeding, animal production, natural resource and social economy. Here we said goodbye to Sisay Demeku, who stayed at this research centre, and we proceeded to Weldiya, where we stayed over night.

The Chinese Road

Tuesday 12 September 2006, Franziska Grossenbacher

At 6.30 in the morning we were all woken by the knocking at the door of Amare Bantider. He wanted to be sure that every student was ready for departure. It was important to leave early in the morning because we didn't know what road conditions we could expect. Our goal was to reach Gonder by the end of the day. But we all knew that this goal was fairly utopian due to the fact that the Weldiya-Woreta-Highway itself

is about 300 km long. Nevertheless the plan was to go as far as possible. Knowing that in any case we had our tents with us.

In Weldiya we had a quick small breakfast: some chai and bred. At 6.50 after pumping the busses we left Weldiya in western direction. While leaving the town and its environments we observed something strange: there were a lot of men walking into town, all of them carrying a big slat on the shoulder. We had no idea what kind of job they were doing.

A flat road leads us to the foot of the escarpment followed by a bumpy road climbing 2000 m up to a highland plateau at around 3600 m asl.

Photo 16: View to the lowlands (Photo by Franziska Grossenbacher)

At 8.30 we were having there our first short break at 3300 m asl and enjoy the spectacular view to the lowlands. Once more we glance at the steep fields of the farmers and the terraces. Uphill some baboons are curiously observing us. The road on the plateau is winding along its border. Therefore the drivers are very careful. Unlike others - as the crashed trucks down in the valleys prove. With the higher altitude we can also detect the vegetation change. The plateau lies at about 3500 m asl and is situated in the High Dega agro-ecological belt.

At 11.30 we stopped for lunch. We could not find out where we exactly were because this village seemed to be quite new and was probably not yet on our map. Nevertheless we found a place to eat - as usual - injera, kitfo and shiro. Just a short way after lunch the first bus was forced to stop by a fallen tree. As we wanted to continue our journey

as soon as possible, we jumped out of the bus and carried the tree to the side of the road.

But even on this very long journey the usual themes can't be missed. In the early afternoon we stopped on a important watershed for a hydrological input. To our left side (direction South) the water flowed into the Blue Nile (Abbay), to the right hand (direction North) into the Tekeze Basin. Regarding geology we still were in the trap basalt zone. On the way we passed some Shieldvulcanos such as Mount Guna.

Photo 17: On the highland plateau along the China road (Photo by Franziska Grossenbacher)

Andres Strebel gave us an introduction to the hydrology of Ethiopia (see Chapter 7). I just summarise here the following discussion. The first question was concerning Ethiopian salt lakes. An Ethiopian student explains that many of the lakes are final collectors and consequently get salty. This salt lakes are particularly located at very low elevations in the Rift Valley. The highland lakes (like Lake Tana) are not salty. The second question was about hydropolitics: if Ethiopia would store more water, what were the consequences in the neighbouring countries? The answer given illustrates that in eastern Africa hydropolitics are a very delicate matter and that if Ethiopia would change its policy e.g. in storing water and use it for irrigation, a war could be possible. Somebody added that there are actually negotiations and discussions between Ethiopia, Sudan and Egypt. Egypt as the main downstream user is willing to let Ethiopia use the Nile's and Tekeze's runoff for hydropower- but nobody is well-informed. The last question was how Ethiopia actually could store the water regarding the drainage problems in some regions. Apparently the potential lies in small scale. In arid regions a

great effort could be done in constructing hillside-terraces, in doing zero grazing (keep the livestock out of the fields) and agroforestry.

At 17.45 we passed Debre Tabor. We realised that we would not arrive in Gonder the same day. Our goal was now to spend the night in Woreta. That was still far enough for us as we were already tired of driving. The backs were hurting - the music was still the same. Finally, at 19.30, we arrived in Woreta. Once again we appreciated Derese's skills in organisation, or more precisely in improvisation. After some minutes, he organised rooms for all of us. We had to split into two groups and go to two different hotels. In some rooms, unpleasant surprises awaited some of the students. Elias, on his birthday, had to fight against a rat. Antonia had to ask the cleaner to remove a used condom from her room. But finally we were all happy to have a bed to rest and recover from the tiring day.

From Woreta to Gonder and onwards to Debark

Wednesday 13 September 2006, Alemayehu Assefa and Veronika Elgart

After a more or less recovering night in Woreta the day started off in the bus again. Now we were back on a tar road and heading North. Our first stop was Gonder, and the final destination of the day was Debark, the gateway to the Simen Mountains National Park (see Chapter 18).

The first part, Woreta to Gonder, led through a rather flat terrain. The road runs parallel to the eastern shore of Lake Tana, of which one got a glimpse every now and then. It was the Fogera wetlands. The plain was created by the outflows of the nearby river basins. The soil does not dry up until the month of May. Therefore, the area is now used for rice production. Rice fields fringed the road on both sides, Lake Tana glinted in the morning sun, and green, gently rising hills to the right border the wetland area (figure 1). Aster Aweke sings out of the bus's raspy speakers. Some of us catched up with sleep. We reached Gonder around midday.

Gonder was made the capital of Ethiopia by Emperor Fasiladas in 1636. The city became the country's first permanent capital since Lalibela and flourished for the next 200 years. It was a very colourful period in Ethiopia's history. Castles, churches and, not last, restaurants are scattered around the city. We entered a European restaurant with the unsaid hope to come by familiar meals. Funny enough, several other Swiss had found their way to this place. As time was short in Gonder, we restricted our visit to the Royal Enclosure (see Chapter 3).

Photo 18: View out of the bus near Addis Zemen (Photo by Veronika Elgart)

Photo 19: Royal Enclosure, Gonder (Photo by Veronika Elgart)

It is an area of 75'000 square metres surrounded by high stone walls and it holds several castles. The oldest castle and probably the most impressive one is the Fasiladas' Palace. Reputedly, it is the work of an Indian architect and shows an unusual mixture of Indian, Portuguese, Moorish and Aksumite styles.

He reigned the country from 1682 until 1706 and is considered as the greatest ruler of the Gonderine period. In former times, his castle was sumptuously decorated by paintings, ivory and gold leaves.

Our guided tour continued to the Lion House, where Abyssinian lions were kept until recently, and ended in Dawit's Hall where religious ceremonies and lavish entertainments took place. Both were built by Emperor Dawit (1716-21).

Shortly after Gonder, the street turned to a gravel road again. The buses slowed down to 'Ethiopian speed', i.e. an average 30km per hour. We found ourselves back in our rocking bus seats looking out of the window and enjoying Ethiopia's landscape. Farm plots covered with barley, wheat and peas passed by. Aster was singing. Weather conditions started to turn cold. We reached Debark in dusk. Who missed out on buying a GABI so far, did so now. The night was cold.

Photo 20: Fasiladas' Palace (Photo by Veronika Elgart)

Nearby we find the Palace of Iyasu I.

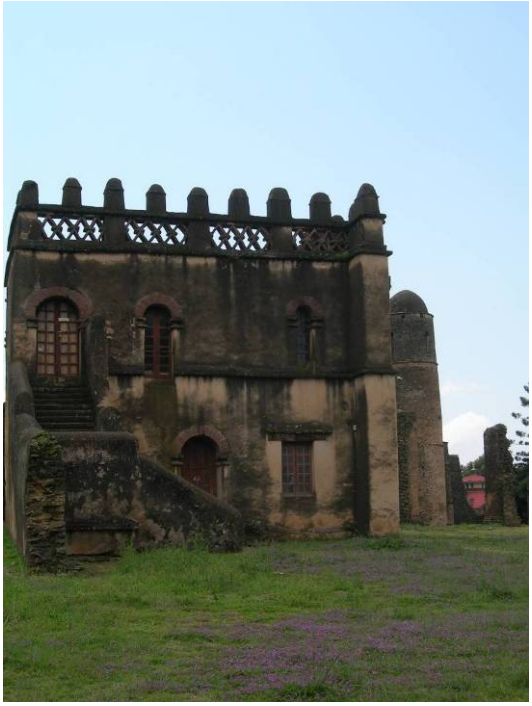


Photo 21: Palace of Iyasu I (Photo by Veronika Elgart)

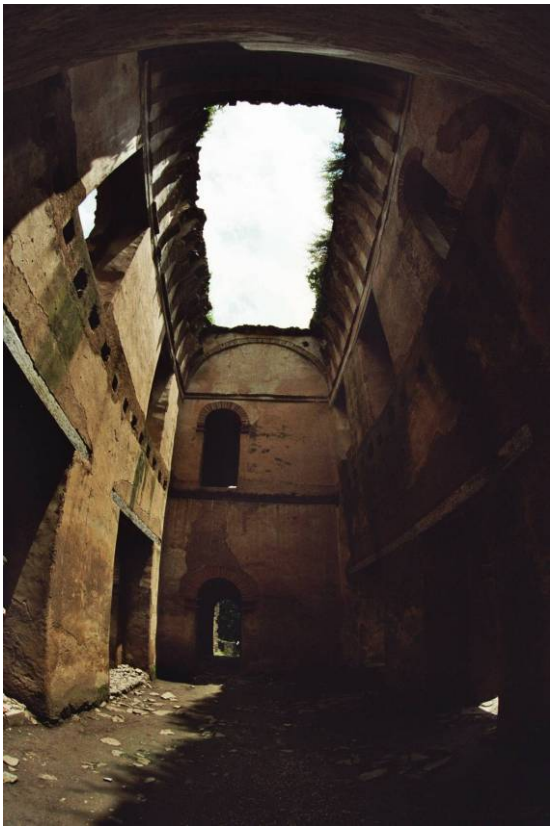


Photo 22: Interior of the Palace of Iyasu I (Photo by Veronika Elgart)

Photo 23: In Debark (Photo by Veronika Elgart)

Detour from Debark to Dip Bahr and back to Debark

Thursday 14 September 2006, Christine Hauert and Solomon Hishe

Actually, the day's program was to enter the Simen Mountains National Park and to stay there for two nights (see Chapter 18). We had a permission letter from the ARARI in Bahr Dahr to enter the park, but the park guards in Debark didn't know if they could allow a group of the University to visit the park.

So early in the morning Hans Hurni tried to contact the Park Officials in Bahr Dahr to confirm our permission for entering the park. Unfortunately he didn't succeed because the telephone line wasn't working this day. Despite the cooperation letter the park officials were not interested in allowing us to enter the Park.

The whole group was very disappointed of not being able to enter the park. As alternative options Hans Hurni thus planned to show us the Simen Mountains from the lowland area of Adi-Arkay, a place 180km away from Debark and outside the park boundaries.

Photo 24: View from the point where we stopped for making pictures and the officers forced us to go back (Photo by Christine Hauert)

So around 10.15 we left Debark and after we travelled a serpentine road called Limalimo for about 10kms, we stopped at the outer bench mark of the park boundary for taking some pictures, because the view from this point was marvellous.

Unexpectedly the park protection officers, who were following us by car, stopped in front of our buses. The park officers wanted us to stop taking pictures immediately, as we would still stay inside the park frontiers and they even threatened us with taking our cameras. Actually the park had planned to expand its boundaries until the place we stopped, but this enlargement wasn't yet official at this time. But nevertheless, they accused us of "visiting" the park illegally and wanted to force us back to Debark and even to Gonder or Bahr Dahr. So our Swiss and Ethiopian tour leaders started discussing with them and wanted to convince them that we could drive further. But there was no point of discussion, and we finally had to turn our cars and drive back to Debark. So after the disappointment in the morning the general mood in the group got even worse (see Chapter 14 and 15).

We reached Debark after about an hour and the discussion with the park guides went on in the office in Debark. In the meantime the group was waiting nearby the buses and everyone got more and more impatient of waiting the whole day. But finally, Hans Hurni got the message that the fax with our permission had arrived from Bahr Dahr just after we had left Debark. So we just had to pay the fee for entering into the Park ,and then we could go.

Photo 25: Main road in Debark, when the bus drivers decided to turn and not to drive to the park on this day (Photo by Christine Hauert)

After eating our lunch we tried to move to the Simen Mountains at around 3.15 p.m. We were still on the road in Debark when our bus drivers decided that it would be too dangerous to continue this day, because it just started raining heavily and the street conditions were getting worse (see Chapter 4).

After quite a tumultuous day we got at least the permission and so the day ended at least positive.

Visiting the Simen Mountains National Park

Friday 15 September 2006, Antonia Eisenhut and Andres Strebel

Early in the morning at 5.45 we left Debark in the direction of the Simen Mountains National Park. The big hole in the road, which had made it impossible for us to drive to the Park the day before, had been filled with stones over night by workers of the Park authority. So our trip to the National Park got definitively real. On this way there were some other muddy road sections to manage and we could have been glad that there was no rain making the roads impassable for our buses.

After little more than one hour driving we passed the gate to the Park. Some driving minutes later when we reached the real boundary of the Park and we made a first stop. Hans Hurni told us that in this area, at an altitude of about 3000 metres, fighting between the Derg and the EPRDF had taken place in 1989-1991. As a result of the many soldiers living in this region for some time, the wildlife was severely reduced (see Chapters 8, 12, 14,15 and 18).

At 8.30 we reached Sankaber Camp. Here we were pitching the tents for the night and packed the equipment for a daily hike into the National Park. After completing these preparations, the buses drove us to the starting point of the day's hike near Ambaras. We reached this place at about 10.30 in the morning. On the opposite side of the valley the village of Gich is located. This village is in the middle of the National Park. By virtue of backdating pieces of charcoal the age of the village is assumed to be around 500 years. The village probably got established by Muslims pushed into the forest by Christians after Mohammed had been defeated. The inhabitants of the village and their agricultural activities led to a dramatic soil erosion in this area. The originally thick A horizon in the surrounding area is almost completely removed (even though the people from Gich are changing their cultivation every other year from one side of the valley to the other). Of course these human activities affect the ecosystem of the Park also in these days. For nature in the Park it would be the best to resettle the inhabitants out of the National Park area. But understandably the inhabitants of Gich don't want to leave their old village. This problem is not easy to be solved, and there is a need of negotiations to find a contenting solution for both parties, nature and people (see Chapters 8, 11, 12 and 18).

Around eleven o'clock we started from this place opposite of Gich Village to our hike. The participants of the excursion split up in three groups, according to their self-assessment of their actual physical condition. One group made a quite short hike directly to the opposite side of the valley near Gich and then back to the Sankaber Camp. Another group made a longer daily hike through the National Park to Imet Gogo. The last group took a middle way of these two versions.

During these walks we entered in contact with the typical flora and fauna of the Simen Mountains National Park. On the long one, we first passed through a Lobelia Rhynchopetalum (giant Lobelia) forest (see Chapter 8). These plants were definitively the most impressive ones we saw in Ethiopia. Later, vegetation changed to a dense Erica tree forest, covered with plenty of lichens, giving them a fairytale-like look. From there, the hiking trail rose up to the Imet Gogo (3926 m.a.s.l.), with the landscape becoming scarcer as we got higher. Unfortunately we were not able to spot even a single Walya ibex, for which the Park was founded in 1969. After a rest and a little nap on the summit, we returned via Gich Camp to Sankaber Camp.

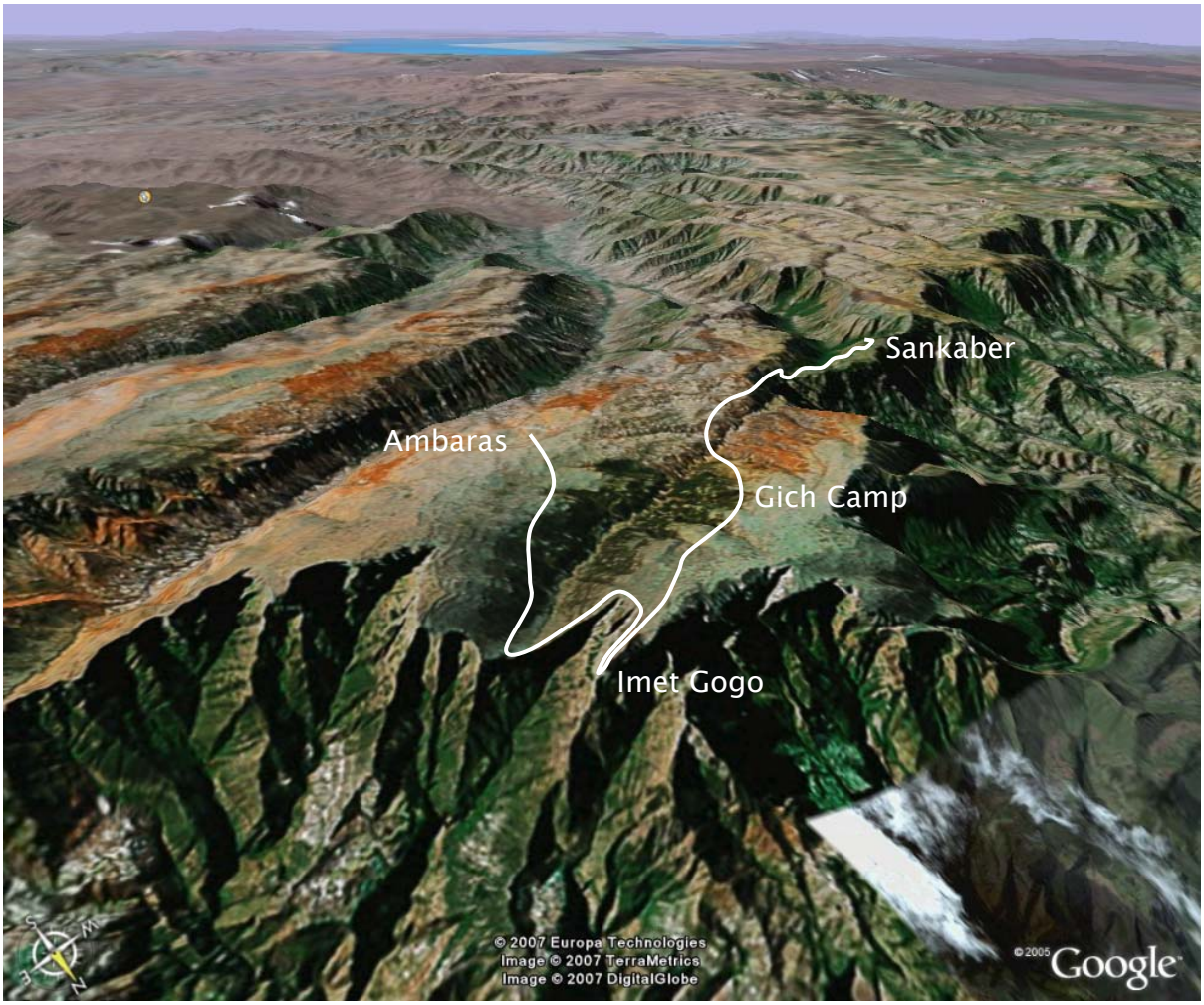


Figure 1: Overview of the hiking trail (Google Earth, drawing by Hans Hurni)

Photos 26 and 27: Giant Lobelias in comparison with Heinz Veit and as clear forest composition (Photos by Antonia Eisenhut)

Photo 28: Lorenz Roten and Stefan Zingg in the Erica arborea forest (Photo by Antonia Eisenhut)

Photo 29: Hiking participants on the summit of Imet Gogo (Photo by Andres Strebel)

On the way back we also saw some large-billed crows (corvus macrorhynchos) and, to complete this wonderful tour, we passed through a flock of Gelada Baboons (Theropithecus gelada). Unfortunately it was already getting dark, so there was very little time to observe their fascinating behaviour.

Photo 30: Large-billed crow Photo by Andres Strebel)

Photo 31: Gelada baboons mothers with their children (Photo by Andres Strebel)

For the evening meal all the participants found back to the tents in Sankaber Camp. Here we got a nice supper consisting of minestrone and spaghetti.

Photo 32: Preparation of the dinner (Photo by Andres Strebel)

Outlook at Sankaber Camp and back to Debark

Saturday 16 September 2006, Daniel Loppacher

Start: Sankaber Camp 09^{00} (3200 m asl)

The wake up call was for once not that early, which lead thereto that some participants drank late into the passed night. However the night in the tent was humid but recovering for me, since I felt stomach sick for the last two days. Get out of the sleeping bag; pack the tent, ready to go. After a delicious breakfast cook by our support group from Debark, we started our short walk of 30 minutes to the viewpoint "Nigus Aisemush". The weather was good, no rain for once and no heavy backpack; everybody was in a good mood. As we arrived at the viewpoint fog obstructed the promised view. Fortunately it would clear up later on, and we had an astonishing view on the valleys with its steep cliffs covered with wild forest.

Photo 33: An example of the view in the Simen Mountains (Photo by Daniel Loppacher)

The group sat down, some lay down, birds were singing, and the sun burnt on our bodies. It felt great after having several days of rather bad and cold weather. Franziska Grossenbacher started with the first presentation about the wildlife and the vegetation belts, generally divided into two major regions: the plateaus and mountains (see Chapter 8). Once upon the time a huge area of Simen (1600 km^2), mostly of the highlands, was covered by original forest but due to human impacts but today only a poor rest remained (200 km^2). Furthermore she named all the different animals existing in Ethiopia and talked about the National Strategy of Conservation.

We heard a lot of interesting facts by her and some plants we could even see in the surrounding environment. Unfortunately again, we could not see a singly Walya ibex, while we were able to come near by Gelada Baboons. Christine Hauert and Gianreto Stuppani held the next speech about paleoecology and climate change (see Chapter 10). We got to know that the climate went through different changes, which are also observable by geomorphological features of the landscape such as periglacial deposits, by shifts in vegetation, and through fossils of mammals and hominids. Especially during the last 20'000 years the African Mountains have experienced significant climatic change. As often a quite animated discussion between the students, the Ethiopians and the professors arose. As usual a lot of additional information to this topic was given; Heinz Veit spoke about specific climatic issues in the tropics (see

Chapter 9), and Hans Hurni added some very interesting knowledge from his long stay

in this area since 1974 (see Chapter 18).

Photo 34: Baboon in the area around Sankaber Camp (Photo by Daniel Loppacher)

Time ran fast, at 11.45 we left because we still had to manage the way back to Debark with our buses before rains would start. The bumpy roads were still wet and to what difficulties this can lead we would experience later in the day. But one after the other, before we were free to eat lunch, and for the first time for us while in Ethiopia, rice was served.

On the way home we passed a tourist lodge under construction and were invited to look inside the building and listen to Nick, proud owner of the lodge. According to him the lodge should bring a lot of advantages to the local people, since all the employees will be Ethiopians out of the region (see Chapter 2 and 13). After this unexpected excursus, time has definitively come to return back to Debark.

At about three o'clock we arrived on the outskirts of Debark, but the most thrilling adventure was just about to come. The mud on the street was still wet from the rainfall that occurred earlier in the day and therefore it was very slippery. Moreover, the street was slightly inclined to one side. Altogether it was too much for the till now so reliable buses. Both slowly started to slide side wards in the back, quite a funny feeling when sitting inside. Everybody had to get out and help to bring them back on the road. Not an easy challenge, as it was hardly possible to walk on the slippery underground. Needless

to say that a group of white and black people pulling a bus back on the road was the attraction of the day. Somehow we managed the challenge and the bus drivers could safely drive to the hotels. Empty since we all made the last metres on foot. All in all a very funny, relaxing and in the end exciting day. The rest of it we could spend by doing whatsoever.

From Debark to Gonder and onwards to Bahr Dar

Sunday 17 September 2006, Manuela Born

The buses left Debark soon after six o'clock. We were heading Southwards, our destination for this day was Bahr Dar. Some of us hoped that we would arrive early, so that a trip to the Blue Nile Falls would be possible.

In Gonder, we made a breakfast stop. As usual, the group split up and we were about six people who entered a juice bar and ordered a mixed juice. The avocado juice was sour and we asked for another one. The waiter went to the kitchen for tasting the juice himself. But the waiter did not taste it sour and therefore did not want to replace it. A little bit irritated, some ordered a second juice and paid both glasses while I decided to drink the avocado juice. Mixed with the other juices it did not taste bad. The next day, I get a diarrhoea. It lasts for more than a week, but I don't know whether it was the juice or not. At least we then had a discussion about tourism in Ethiopia. In our opinion, if the service for tourists were improved, not only in restaurants, Ethiopia could benefit

much more from tourism than nowadays (see Chapter 2).

Photo 35: The juices always look great (Photo by Manuela Born)

In the early afternoon, we arrived in Bahr Dar. Some people just put their luggage into their rooms and drove on to the Blue Nile Falls. Others had enough of sitting in the bus and decided to stay in Bahr Dar and to have a look at the city. I have seen the Blue Nile Falls before, which are situated at about 30km downstream from Bahr Dar, so I decided to stay in town. After strolling around in town and on the market, it was time to take a shower and to get ready for dinner. Also the group which visited the Blue Nile Falls is back now. They were lucky, the falls were big and impressive. At the end of the rainy season the runoff can be up to 60 times greater than in February when it has its minimum runoff. Additionally, the hydroelectric power plant was under maintenance and the ones who visited the Falls could enjoy an extraordinary high runoff (see Chapters 2 and 4).

Photo 36: The Blue Nile Falls in the rainy season (17 September 2006) (Photo by Veronika Elgart)

I was there during the dry season in May 2006 and only a very small amount of water was going down the falls.

Photo 37: The Blue Nile Falls in the dry season (25 May 2006) (Photo by Manuela Born)

We expected important guests to our dinner in the Tana Hotel. Therefore, everybody put on the nicest clothes, but in many cases, this was the same pair of outdoor pants which we were wearing two days ago hiking through the Simen Mountains. Anyways, everybody was looking forward to the dinner. First, Hans Hurni presented our guests:

- HE Mr. Ayalew Gobezie, President, Government of Amhara Nation Regional State (GANRS), Bahr Dar
- Dr. Getachew Alemayehu, Director General, Amhara Region Agricultural Research Institute (ARARI), Bahr Dar
- Mr. Mulugeta Woubshet, General Manager, Parks Protection and Development Authority (PPDA), Amhara Region, Bahr Dar
- Mr. Amsayaw Anteneh, Deputy Head of the Bureau of Finance and Economic Planning for Amhara Region

After some short speeches explaining who we are and what the reasons and the aims of our trip are, the buffet opened. And it was delicious. Everybody enjoyed the meal and the wine, of which there was plenty.

After a long dinner we drove back to town. Some students started singing in the bus, and most of us seemed to be in a very funny mood. Just perfect to follow on of our Ethiopian colleagues, who knew a nice bar in the city. It was a really nice bar. There was a lot to drink, a nice mix of Ethiopian and international music, some locals, a sofa corner to chill; everything an Ethiopian-Swiss group of students and their professors needed.

Photo 38: During our dinner in Tana Hotel (Photo by Manuela Born)

Back in my hotel room, I was happy to go to bed. It was late, and I slept immediately, wondering, if I really would get up in time the next morning. I was pretty sure that not everybody would be awake when we were supposed to leave.

Visiting Anjeni Research Station in Gojam

Monday 18 September 2006, Eduardo Ronc

Our stay in Ethiopia had already reached its climax in Bahr Dahr. On our way back to Addis Abeba, we had planned to arrive in Debre Markos during daytime. The highlight on this cloudy and drizzly day – another yet of the many we had the privilege to experience – was Anjeni in the Gojam Region, a third Research Station of the Soil Conservation Research Programme we had a chance to visit (see Chapter 16).

Firstly though, very early in the morning – maybe too early for some of us –, we rendered a short visit to the Amhara Region Agricultural Research Institute (ARARI), a research facility that was still under construction, in the suburbs of Bahr Dahr. Then we began our return trip on the very comfortable main road connecting Bahr Dahr with Addis Abeba.

The ride was interrupted by some short stops in order to get some food, always taking a look at some rusty dead military tanks and other scenic natures.

However, with 65 km to go, we had to leave the main road for a rural road through a hilly landscape in order to reach Anjeni, which is situated at roughly 2'500 metres above sea level.

Upon our arrival we were – once again – happily greeted by a merry bunch of children. During the entire stay in Anjeni they were our friendly and permanent entourage. Apparently the invasion of 30 something geographers both of the aspiring and well versed genre was a highlight for this rural community.

Photo 39: Partial view of the agricultural land in Anjeni Research Station of the SCRP In Gojam- terraces with runoff control system in each parcel (Photo by Eduardo Ronc)

This might come as a surprise, since the Institute of Geography of the University of Bern had set up the research station in Anjeni in 1984. Interestingly, this station has been built in an area characterised by high precipitation, spared of famines and rich in agricultural diversity. 60 percent of the small Minchet River valley (an area of 100 acres) is agricultural land (for further information on the climatic and environmental situation of Anjeni see Chapter 16.3).

Nevertheless, this soil is extremely prone to erosion. Damages in form of chutes, valleys and decreased soil can be witnessed everywhere (see Photo 34 and Chapter 11).

Photo 40: Major gully of the Minchet River below Anjeni Village within the research catchment (Photo by Eduardo Ronc)

Almost all of the natural forest has disappeared.

Equally visible are the soil conservation measures that have been introduced, such as drainage systems, terrace construction and reforestation. As an admirable fact it has to be noted that these measures were implemented in 1986 within three months and without any direct financial support. Quantifying the total costs of the project they would have added up to 100'000 Swiss Francs. Furthermore a local project in form of a construction of a hospital was supported. Still in our days this hospital continues to be the pride of the community.

With this approach a new methodology to realise environmental projects was born. The project does not focus on direct payments that eventually leave people dependent on charities. Instead the successful outcome is based on information sharing, motivation, mobilisation and incentives. Therefore Anjeni was considered a new paradigm in soil and water conservation.

Strolling through this picturesque landscape, we were able to directly appreciate these implementations (see Photo 37).

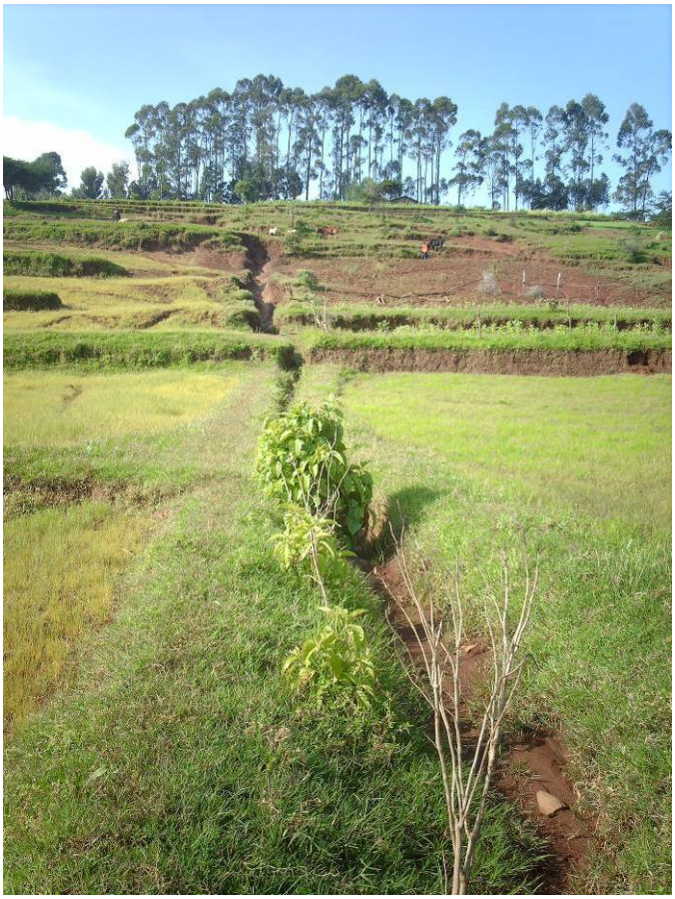


Photo 41: Waterways at the boarder of the fields, fortified with botanical growth (Photo by Eduardo Ronc)

We were explicitly told that water overflow still exists and that the measures that have been introduced are primarily aimed at minimising soil erosion.

Finally we reached the measuring station, which was built first by a Swiss MSc Student (Christoph Werner) during his studies in 1984. There we took the first official group pictures, whilst still being surrounded by some friendly inhabitants of Anjeni.

All of them accompanied us to our two coaches and bid us farewell very warmly. The remaining journey to Debre Markos took place without any further incidents, even though it was pitch dark when we arrived at our destination. Our group was accommodated in two different hotels.

This night all of us were exhausted from the exciting and impressive but very long journey. Some group members directly went to bed, while others took up the opportunity to acquaint themselves with the bizarre gastronomic culture of the Hotel Royal.

Photo 42: Measure instruments of the Anjeni Research Station of the SCRP (Photo by Eduardo Ronc)

Photo 43: Study tour participants In Anjeni (Photo by Michael Rüegsegger)

From Debre Markos through the Blue Nile Gorge to Addis Abeba

Tuesday 19 September 2006, Stefan Zingg

The last stage back to the capital city promised to be an impressive highlight of our journey: The crossing of the Blue Nile Canyon. Our busses had to manage twice the challenge of 1300m altitudinal difference.

Starting in Debre Markos the anticipation increased approaching the canyons edge. A short part after passing the edge we stopped for several discussions:

Geology: After two weeks walking or driving on basalt we could see for the first time something different. The impressive erosive work of the Blue Nile exposed the younger part of the Mesozoic sediment sequences under the even younger Tertiary basalt layers on top of them (see Chapter 6).

On the picture you can see the unconformity between the yellow Mesozoic limestone and the overlying dark basalt rocks.

Photo 44: The basalt – limestone sequence (Photo and drawing by Stefan Zingg)

Ethiopia in the international context: We discussed with Antonia Eisenhut how Ethiopia moved and moves on the international parquet and how it tries to solve its problem by interacting with other countries. We focused especially on the collaboration with Switzerland (see Chapter 5).

Economic dimension: Market failure and development: This discussion with Kaspar Hurni tried to resume a difficult subject that raised up several times on our study tour. We recognised again that solving the economical problems of Ethiopia is a very complex topic. An internal shift between the sectors from agriculture to the secondary and tertiary, and an increase of market processes are essential steps, but it is nearly impossible to find a way to carry this out (see Chapter 13).

Continuing our journey we passed over the strongly guarded bridge on the Blue Nile. It was not allowed to take pictures, but the walk on the bridge over the stream was nevertheless a nice experience. Climbing up the road we got again the view on a beautiful landscape, on sad car accidents, on road construction problems and, for the second time, on the unconformity between geological units. Back at 2300m asl on the usual basalt surface we continued towards the capital city, with a lunch stop in Gebre Guracha, and arrived well back at Simen Hotel in Addis Abeba in the evening.

Our bus drivers drove us safely through all situations. Thanks a lot to them and their assistants!

List of Participants

Tour leaders

Karl Herweg (PhD)
Amare Bantider (cand. PhD)
Heinz Veit (Prof. Dr.)

Assistant leaders

Berhanu Debele (Regional Coordinator)
Brigitte Portner (MSc)
Derese Gebre-Wold
Samuel Hurni (cand. Med.)
Hans Hurni (Prof. Dr.)
Birru Yitaferu (cand. PhD)

Ethiopian Participants

Alemayu Asefa of AAU (MA student Geography)
Berhan Asmamaw of AAU (MA Land Mgt stream)
Elias Fekade of AAU (MA student)
Melese Tesfaye of Haramaya University (SC)
Sisay Demeku (Sirinka)
Solomon Hishe of Mekele (staff GIS)
Tadele Amare of ARARI (Staff Adet NR)
Tewodros Assefa of Haramaya University (SC)
Terefe Bogale of AAU (MA defended)

Swiss Participants

Andreas Obrecht (MSc student)
Andres Strebel (MSc student)
Antonia Eisenhut (MSc student)
Christine Hauert (MSc student)
Daniel Loppacher (MSc student)
Eduardo Ronc (MSc student)
Franziska Grossenbacher (MSc student)
Gianreto Stuppani (MSc student)
Ivo Strahm (MSc student)
Kaspar Hurni (MSc student)
Lorenz Roten (MSc student)

Manuela Born (MSc student)
Michael Rüegsegger (MSc student)
Stefan Salzmann (MSc student)
Stefan Zingg (MSc student)
Sylvia Lörcher (MSc student)
Veronika Elgart (MSc student)