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Planted Forests and Trees Working Papers

**THE NETHERLANDS TRUST FUND SUPPORT TO SUSTAINABLE
FOREST MANAGEMENT IN LOW FOREST COVER COUNTRIES**

***ROLE OF PLANTED FORESTS AND TREES OUTSIDE
FORESTS IN SUSTAINABLE FOREST MANAGEMENT:***

***REPUBLIC OF ETHIOPIA
COUNTRY CASE STUDY***

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Foreword

People of developing countries facing desertification and severe land degradation, particularly in arid and semi-arid areas, can experience extreme food insecurity and abject poverty. In most countries, their relationships with forests and trees are inseparably interlinked and interdependent. Poor people recognize that forests and trees protect soil, water and biological diversity, provide shelter and shade for their villages as well as havens for cultural customs and help to combat desertification. To meet their basic food, fuel-wood, fodder, medicine and construction materials from the meagre resources available, they adopt survival attitudes, overexploit forests and rangelands, and provoke alarming rates of deforestation and forest degradation, which further erode their livelihoods.

Decentralized, participatory, intersectoral and multidisciplinary approaches to policy, planning, implementation and monitoring are new to many developing low forest cover countries. They require new institutional frameworks as well as training and skills in forest planning and management. The voice of the forestry sector, which has generally been marginalized, needs to be mainstreamed in intersectoral planning committees and working groups to derive national development priorities and national forest development strategies. In so doing, it should examine the real value and potential roles of natural forests, planted forests and trees outside forests in supporting landscape restoration and sustainable livelihoods in urban and rural landscapes.

It is critical to integrate planted trees and forests in more holistic approaches to provide environmental services, biodiversity benefits and meet people's short and long-term needs. It is also necessary to make modern technology and traditional knowledge available in more people oriented approaches to be shared through national and international networks, and sound extension and technical support systems and demonstrations.

This case study was carried out under the FAO-Netherlands Partnership Programme to support Sustainable Forest Management in Low Forest Cover Countries in the Near East and African Regions. It is one in a series of six carried out in Iran, Oman, and Tunisia in the Near-East Region to form the basis of the Teheran Workshop, 28-31 October 2002 and Mali, Ethiopia and Namibia in the African Region to form the basis for the Nairobi Workshop 26-29 November 2002.

The case studies, chosen to represent the uniquely different ecological, social, cultural, environmental and economic conditions prevailing in the regions, were conducted to evaluate the role of planted forests and trees outside forests in supporting sustainable forest management and landscape restoration in low forest cover countries. Natural forests, rangelands, woodland resources, trees outside forests, agroforestry, urban and peri-urban forestry all play important roles in supporting the social, cultural, environmental and economic landscapes, particularly in low forest cover countries.

This case study focuses on the major issues, the policy/legal/institutional contexts, status of forests and rangelands, constraints, opportunities, gaps in knowledge, lessons learned and the proposed actions for the way forward. This is a first step in translating policies and proposed actions towards implementation.

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List of Acronyms

CILSS	Inter States Committee to Fight Drought in the Sahel
CSE	Conservation Strategy of Ethiopia
EARO	Ethiopian Agricultural Research Organization
EFAP	Ethiopia Forestry Action Program
EPA	Environmental Protection Authority
ETB	Ethiopian Birr (local currency)
FAO	Food and Agriculture Organization of the United Nations
FOSA	Forestry Outlook Study for Africa
FRC	Forestry Research Centre
GDP	Gross Domestic Product
GEF	Global Environment Facility
GTZ	German Foundation for Development
IBCR	Institute of Biodiversity Conservation and Research
IGAD	Inter-Governmental Agency for Development
ITK	Indigenous Traditional Knowledge
JICA	Japan International Cooperation Agency
LPG	Liquefied Petroleum Gas
MAI	mean Annual increment in m ³
MEDAC	Ministry of Economic Development and Cooperation
MOA	Ministry of Agriculture
MT	Metric tons
NCB	National Council on Biodiversity
NGO	Non-governmental Organization
NWFP	Non-Wood Forest Product
NFPA	National Forest Priority Area
SADC	Southern Africa Development Community
SFCDD	State Forest Conservation and Development Department
SIDA	Swedish International Development Agency
SNNPRS	South Nations Nationalities and Peoples Regional State
TOF	Trees out of forests
UNCED	United Nations Conference on Environment and Development
UNDP	United Nations Development Program
UNSO	United Nations Sudan-Sahelian Office
USD	United States Dollar
WBISPP	Woody Bio-Mass Inventory and Strategic Project
WWF	World Wildlife Fund

Executive Summary

The open-ended international expert meeting on special needs and requirements of low forest cover countries proposed outputs and activities to achieve sustainable forest management. The Netherlands approved to support country case studies for Africa and the Near-East regions that outline the causes and effects of deforestation and document the lessons learned and the priority needs to enhance the role of planted trees. The present case study concerns the Federal Democratic Republic of Ethiopia.

Composed of lowlands¹ and highlands², Ethiopia covers 1 120 000 km² and occupies a good portion of the Horn of Africa, sharing boundaries with Djibouti, Somalia, Eritrea, Kenya, and Sudan. There are 3 major agro-climatic zones: (i) without significant growing period; (ii) with 1 growing period; and (iii) with 2 growing periods. Combining growing period zones with temperature and moisture regimes has allowed the identification of 14 agro-climatic areas, which have brought about the development of 15 land-use, 48 cropping and 19 livestock breeding patterns and at least 6 farming systems.

Ethiopia has an abundant diversity of biological resources, both in terms of flora and fauna, which is due to its rich variety of environmental features ranging from semi-desert to mountain forests and its wide range of ecological, edaphic, and climatic conditions. Plant genetic resources are very diverse with for instance, over 7 000 flowering plant species recorded, of which 12% or more are probably endemic.

Ethiopia's 1999 population reached 61,7 million (density 47 pers/km²), of which 85 % rural and 15 % urban. With an annual growth of 2,92 % it is projected to reach 129 million by 2030. The Highlands, which constitute 45 % of the country's area, are home to 80% of its people and support 70% of the livestock population. About 50% of the people suffer food insecurity, or live below the poverty line. Severe, chronic and transitory food insecurity arises from drought, conflict, and people's displacement.

The Federal Democratic Republic of Ethiopia includes 64 nations and nationalities within 14 regional states. The 2 legislative houses are the Council of Peoples Representatives and The Federal Council. The federal ministries are in charge of preparing national policies and development plans. Lacking an Agriculture Policy, the government designed the "Agricultural Development-led Industrialization", a framework for the 5-year agriculture program. The national development strategy focuses primarily on improving productivity of peasant agriculture and developing large-scale commercial agriculture. The national food security strategy, which is in preparation, involves many stakeholders and local people at large. The environmental policy approved in 1997 aims at supporting soil and water conservation and reversing the poor households' asset base depletion negative trend.

With a GDP of USD 6 108 million and a per capita annual income under USD 120 (1994) Ethiopia is one of the poorest countries in the world. Agriculture directly supports 85% of the population in terms of employment and livelihood. It accounts for 46 % of the GDP and as such is the dominant sector of the Ethiopian economy, providing 90 % of total exports. The contributions to GDP of the next two dominant sectors are 11,2 % for industry and 39,1% for

¹ Elevations inferior to 1 500 m

² Elevations superior to 1 500 m

services. In 1982-1992, forestry accounted for about 5,5 % of the agriculture sector and 2,5 % of the total GDP, but these figures underestimate the total contribution of the forestry sector to the country's economy.

Information on forest and woody biomass vegetation cover is limited. The last surveys by FAO (1984) and Cesen (1986) are now outdated and this is a major impediment to planning and implementing sustainable forest management. A forest resource desk study survey reported 3,5 million ha of natural forest cover in 1990. Forest decline is evident from the fact that the 16 % forest cover of 1950 has declined to 3,6 % in the early 1980s and to 2,7% in 1989. With the 5 million ha of savannah woodlands, the total forest area covered 7 % of the country. In 1988-1989, forest industries employed 2,2 % of the country's workforce. Currently forestry employs some 35 000 persons (government/industry) and 400 000 persons (fuel-wood harvest, processing and distribution).

Estimates of annual natural forest cover decline contain important discrepancies, ranging from 62 000 ha to 150 000-200 000 ha. Species' composition and tree density have decreased overall as has natural regeneration. Most forests are under-stocked and composed of deformed and over-aged trees.

Planted forest estimates range from 216 000 ha to 255 214 ha. Mainly of exotic species, they comprise 76 050 ha of industrial plantations and 179 164 ha of fuel-wood/poles plantations, of which 79 500 ha established by farmers and communities and 99 664 ha by the public sector. Urban plantations are mainly located around Addis Ababa and other major towns. Though TOFs constitute important wood and non-wood products' sources, their total area is not known. A significant increase in on-farm tree planting has occurred following the change of state policy on individual tree tenure. The national annual planting rate is estimated at 17 000 ha, i.e. 10 % of the annual deforestation rate.

Despite defining criteria for sustainable forest management, poor logging practices and silviculture without control or a management scheme have depleted natural forests, whose legal status has not yet been established. No concerted planning effort is made, except for 8 management plans, whose responsibility rests with the regional bureaus. Every year about 24 million m³ of wood are harvested from natural forests; 80% of which is consumed as household fuel, another 10% as building material and transmission poles, leaving the balance for other uses. NWFPs are very important and include: food commodities, resins, incense, spices, condiments, industrial plant oils and waxes, plant gums, medicinal plants, natural honey and bees wax, animals and animal's products and tourism.

MOA is responsible for the forestry sector at the federal level, while the regional bureaus of agriculture are now responsible at regional level. The forestry sector in Ethiopia has undergone fundamental changes as a result of the decentralization of planning and decision-making. However, budget allocation and staff resources remain too low to ensure effective participatory forest monitoring and sustainable management. Policies have been developed to encourage and attract the private investment in forestry development. The state acknowledges the importance of forestry research in generating appropriate, conservation and management technologies. However, the number of graduate foresters is still below what is needed to carry out the challenging responsibilities of forest research and management and of implementing the National Action Plan to Combat Desertification.

Chapter 4 analyses the causes and effects of deforestation and forest degradation, highlighting the underlying causes, which indirectly affect the forest estate (poverty, incentives, lack of

tenure and users' rights security, lack of data and information, consumption patterns etc.) and the most important effects of deforestation namely: the loss of productive forest lands and of revenue-generating NWFPs.

Chapter 5 examines the lessons learned (need for decentralization, integrated participatory forestry development, tenure security, policy and legal reforms etc.) and identifies gaps in knowledge (extent and impact of desertification, capturing farmers' experience and managerial skills, initiating full participation/ partnership in rural community development, development of statistical databases etc.).

The report's main conclusions and recommendations may be summarized as follows:

The degradation of Ethiopia's environment following the destruction of forests and the subsequent loss of ecosystems are a big threat to forestry and require: (i) increased efforts to protect and manage natural forests; (ii) the establishment of new forest plantations to secure and increase the supply of forest products; (iii) the improvement on collecting, processing and marketing of forest products; and (iv) highlighting and integrating food security programmes, the importance of wood and non-wood forest products for the economy of rural households.

With regard to development issues, it is recommended that the use of trees outside forests be promoted also to (i) encourage the introduction of trees into agricultural landscapes; (ii) stress the worth of NWFPs for income generation and food security; (iii) create awareness on use and value/contribution of forests and TOFs to the GDP; and (iv) organize a workshop on *Forests and food security in Ethiopia*.

In terms of technical initiatives and recognizing the value of future forest and rangeland management, it is recommended to: (i) monitor physical changes in land use, especially with respect to the area of forests, using the Woody Biomass Inventory and Strategic Planning Project as the entry point; (ii) modify wood fuels consumption patterns by promoting alternative sources of energy; (iii) develop more efficient woody biomass resource uses; (iv) develop an integrated Forest Fire Management System; and (v) conduct training to enhance the skills of professional forest managers.

In terms of administrative and legislative aspects, it is recommended to: (i) review land use and forest policies and legislation so that they are people and environment focused; (ii) transfer the management of forests and other tree resources to the local people; (iii) limit the involvement of the government in production forestry and promote and enhance that of the private sector; (iv) develop stable and competent institutions for the conservation, development and sustainable utilization of forests and TOFs; (v) develop appropriate systems to re-use revenues generated from forestry and create fund raising mechanisms to establish environmentally sound additional forestry assets.

With regard to cross cutting issues it is recommended that: (i) women and women's groups as key resource managers receive greater direct support in forest products' programmes; and (ii) target rural credit and training packages for women's groups in NWFPs, as well as participatory planning methods, market incentives, policy reformulation, monitoring and enforcement and income diversification.

Introduction

Ethiopia's forests and trees have played an important role in developing human activities and providing both African and European populations with a variety of economic goods such as fuel-wood, construction materials, food and fodder. In addition to their environmental functions, these renewable natural resources have also contributed significantly to the social, psychological and cultural expressions of Ethiopian people's livelihood.

However, the areas, once covered by forests and woodlands, have diminished rapidly over the last few decades due to a combination of many factors including wood harvesting to satisfy the needs of a fast growing population, fires, overgrazing, harsh climatic conditions, and, up to recently, inadequate forest policy. This has led to shortages of fuel-wood and building material, as well as soil erosion problems in various parts of the country, especially in the more heavily populated areas.

Initiated as a result of the Netherlands' support to achieving the targeted outputs and activities of the "Teheran Process", this mission was implemented by FAO and approved by the Ethiopian Government. It involves preparing a case study over three African countries featuring the Low Forest Cover Countries (LFCCs) of the continent, in readiness for the workshop to be held in November 2002 in Nairobi, Kenya. A member of the Inter-Governmental Agency for Development (IGAD), Ethiopia is one of the three LFCC countries selected by FAO in Africa to conduct case studies regarding the role of planted forests, trees outside forests (TOFs) and non-wood forest products (NWFPs) in integrated landscape management. The other two countries are respectively Mali in the Inter State Committee to Fight Drought in the Sahel sub-region (CILSS) and Namibia in the Southern Africa Development Community (SADC). The mission's terms of reference are detailed in annex 1.

1. General Overview

1.1 *Background setting*

1.1.1 **Brief geographical and historical country description**

Ethiopia covers a land area of around 1 120 000 km², stretching between 3⁰ and 15⁰ N latitude and 33⁰ and 48⁰ E longitude. The country occupies a significant portion of the Horn of Africa and shares boundaries, to the east and southeast, with Djibouti and Somalia, to the north with Eritrea, to the south with Kenya, and to the west with Sudan.

Ethiopia presents a great geographical diversity with high and rugged mountains, flat-topped plateaus, deep gorges, river valleys and plains. It has some of the highest elevations in Northeast Africa with the highest peak reaching 4 620 meters above sea level³ at Ras Dashen, in Gonder. The country has one of the lowest dry land points on Earth in the north eastern Danakil depression (120 m below sea level). The highlands, with an altitude greater than 1 500 m, constitute around 45% of the total area of the country where all lands below 1 500 m altitude are commonly classified as lowlands.

³ The abbreviation for metre above sea level shall be (m) throughout the text.

The highlands and the lowlands present marked differences in terms of climatic conditions, vegetation and soil types, demographic characteristics, economic activities, and cultural traits. The main three physiographic regions of Ethiopia are:

- The North, Central, and South-western Highlands and the associated Lowlands;
- The South-eastern Highlands and the associated Lowlands;
- The Ethiopian Rift Valley, an extension of the Great African Rift Valley, divides the Ethiopian highlands into two parts and has a number of lakes along its floor.

Historically, Ethiopia is one of the oldest settlements and civilisations in the world. Axum, former capital city of Ethiopia, was built in the Fourth Century B. C., and is the country's most ancient city. Emperor Menelik built Addis Ababa⁴ in the turn of the 19th Century. The country has rich cultural and architectural heritages that include one of UNESCO's treasures, the rock-hewn churches at Lalibella.

1.1.2 Governance and administration

The Federal Democratic Republic of Ethiopia is a country of 64 nations and nationalities, composed of 14 national regional states, 12 largely rural nations and regions and 2 urban regions⁵. The basic administrative unit of the region is the Woreda.

The two legislative houses are the Council of Peoples Representative (CPR) and The Federal Council. The former has a maximum of 550 members elected from districts for five years, and the later is composed of representatives of nations, nationalities and people. At least one member represents each nationality and people in the Federal Council for a five-year term.

Regions, defined on the basis of nationality, have been given extensive legislative and executive powers. The constitution has explicitly set the number of regions to nine and has provided them with the right to self-determination from the federation. Many tasks and responsibilities have therefore been transferred from the central government to the regional administration. These include the responsibilities handed over to regional bureaus for managing forests and wildlife, even though the Ministry of Agriculture (MOA) is responsible for policy issues and technical assistance. The regional governments ensure also the enforcement of laws and collect data they submit to the relevant federal body.

In addition to the Regional Executive Organs, 14 line ministries are involved in assisting, advising and initiating polices to ensure enforcement of laws, regulations and directives of the Government (MOA, 1998). The federal government ministries are also responsible for preparing plans and budgets, and conducting studies and research.

The decentralization and devolution processes undergone by Ethiopia lately have resulted in new political and administrative institutions. However, the change of power in favour of the regional states has created challenging tasks to the regional governments that have little capacity to shoulder their new responsibilities.

⁴ Addis Ababa means "New Flower" in Amharic

⁵ Addis Ababa and Harar

1.1.3 Policy and legal framework

While Ethiopian foresters recognize that policy and policy related issues are among the most important factors hampering the achievement of forest management objectives, they have not formulated any forest or land use policy.

The only available piece of legislation is proclamation No. 94/1994 that provides for the conservation, development, protection and utilisation of forest resources. The proclamation recognises three types of forestland ownership, namely: state, regional and private forests. It also states that forest development should derive benefits for local people. In addition, tree cutting, grazing, beekeeping and harvesting all sorts of forest products require a written permit from the appropriate regional government or ministry. It also prohibits cutting products or performing activities in protected forests.

In order to preserve the remaining natural forest, protect the environment, and the genetic pool reserve, 58 National Forest Priority Areas (NFPA) covering an estimated area of 3,6 million hectares⁶ have been selected. However, these protected NFPAs suffer from heavy pressure due to increasing demands for new agricultural lands and fuel-wood.

1.1.4 National Development plans

The federal government ministries are responsible for preparing national development plans. Even though there does not exist yet an agricultural sector policy, the Government has designed the Agricultural Development Led Industrialization, which constitutes the framework for the Five-Year Agriculture Programme. The overall objective of this programme is to close the food gap, and, hence, contribute to poverty eradication in Ethiopia.

1.2 *Environmental Characteristics*

1.2.1 Geology and soil

The present physical features of Ethiopia (mountains, plains, Rift Valley) were formed during the Tertiary period of the Cenozoic era. They result from series of orogeny, volcanism, denotation⁷, peneplanation⁸, faulting and deposition over the years. Igneous rocks cover most of the Ethiopian Highlands and sedimentary and metamorphic rocks exist throughout the country.

Eleven major soil types cover about 87 % of Ethiopia's land surface. The cambisols (13%) are the most represented soil type, followed by the lithosols (12,2%). The other soil types include the vertisols (10%), the xerosols (8,5%), the acrisols (8%), the luvisols (6%), the xelochakes (5%), the regosols (4%) and the yermosols (3%). (Source: FAO, 1990)

⁶ The abbreviation to hectares will be (ha) throughout the text.

⁷ Term used for witness facts (indicators) of past activities

⁸ The result of severe erosion processes that flatten vast areas.

1.2.2 Climate

The climate in Ethiopia is mainly controlled by the seasonal migration of the Inter-tropical Convergence Zone following the sun's position relative to the earth and the associated atmospheric circulation. It is also highly influenced by the complex topography of the country. There are three seasons, namely the: "Bega" dry season (October-January), "Belg" short rainy season (February-May), and "Kiremt" long rainy season that lasts from June to September.

According to Koppen's climate classification systems, Ethiopia has 10 climate types (Lemma Gonfa, 1996). The dominant climatic types are the:

- Hot arid climate;
- Hot semi arid climate;
- Tropical climate with distinct dry winter;
- Tropical monsoon rainy climate with short dry winter;
- Warm temperate rainy climate with dry winter;
- Warm temperate rainy climate without distinct dry season

The traditional, local classification distinguishes five climatic zones in Ethiopia, based on altitude and temperature. They are named:

- "Wurch" for the cold climate type above 3 000 meters;
- "Dega" for the temperate like climate in highlands (2 500-3 000 m);
- "Woina Dega" for the warm climate type (1 500-2 500 m);
- "Kola" for the hot and arid climate type (<1 500 m);
- "Berha" for the hot and hyper-arid climate type.

The mean annual rainfall decreases northwards and eastwards, ranging from about 2000 mm over some pocket areas in the Southwest to about less than 250 mm over the Afar lowlands in the Northeast and Ogaden in the Southeast.

Temperature regimes are also under the influence of altitude, and are characterised by mean annual temperatures varying from about 10⁰ C in the Northwest, Central and Southeast to around 35⁰C in the north eastern edges. Daily maximum temperature varies from more than 37⁰C over the lowlands of northeast (Afar Triangle) and southeast (Ogaden) to about 15⁰C over the highlands of central and northern Ethiopia. In general, the months from March to May are the hottest and lowest annual minimum temperatures occur particularly between November and January. Minimum temperatures reaching frost point during the Bega season are not uncommon over the highlands and temperatures lower than 5⁰C occur also during high rainfall months over the plateaus in the northwest, the centre and the southeast, due to high cloud cover.

There are three major agro-climatic zones: (i) without significant growing period; (ii) with a single growing period; and (iii) with 2 growing periods. Combining growing period zones with temperature and moisture regimes has allowed the identification of 14 agro-climatic zones. (NMSA, 1996)

1.2.3 Biological resources

Ethiopia has an abundant diversity of biological resources, both in terms of flora and fauna, which is brought about by its rich variety of environmental features ranging from semi-desert to mountain forests and its wide range of ecological, edaphic, and climatic conditions.

The plant genetic resources of the country exhibit are very diverse and, according to recent estimates, there are over 7 000 flowering plants species recorded, of which 12% or more are probably endemic.

1.2.4 Water and land resources

Despite the complexity of its topography, Ethiopia is usually classified into lowlands⁹ and highlands¹⁰. There are 12 major geomorphologic units that are further divided into 70 sub-units, 18 soil associations, 6 climatic and edaphic vegetation associations, 6 rainfall patterns, 10 thermal zones, 14 length of growing period zones and 14 production regions (Bekele, 1987).

The land resources' heterogeneity and the rich variety of agro-ecological conditions have brought about the development of 15 land-use, 48 cropping and 19 livestock breeding patterns and at least 6 farming systems. The main land-uses and their distribution are given in the following table.

Table 1: Land use distribution in Ethiopia

Land uses	Area*
Intensively cultivated land	10,3 %
Moderately cultivated land	12,5 %
Afro-alpine and sub-afro-alpine vegetation	0,2 %
High forest	4,4 %
Woodland	2,5 %
Riparian wood land and shrub	0,6 %
Bush land and shrub land	21,0 %
Grassland	30,5 %
Water bodies	0,5 %
Others	17,5 %
Total	100,0 %

Source: Ethiopian Mapping Authority (EMA), 1988.

* Area expressed in % of total country land area

The above table reveals that the major land use forms in Ethiopia are grasslands, cultivated lands and bush and shrub lands. Grazing and browsing occur in more than 50 % of the

⁹ Elevations inferior to 1 500 m

¹⁰ Elevations superior to 1 500 m

country's total land area because they are put into practice in cultivated areas, in woodlands and forests, and in other land use forms. Forests and woodlands cover about 7 % of Ethiopia. Exposed rocks, salt flats and sands cover over 16 % of the total land area. Surface water systems cover about 0,5 % of the country's total land area. Information pertaining to the occurrence and characteristics of groundwater is not accessible.

1.3 Human Factors: Socio-economic Characteristics

1.3.1 Population, Demography

With 53,5 million inhabitants, the population of Ethiopia was the third largest in Africa in 1994, after Nigeria and Egypt. In 1999, it rose to 61,7 million persons, of which 85 % are rural and 15 % are urban (CSA.1999). With a current annual growth is 2,92 % the population is projected to reach 129,1 million by the year 2030. The present average population density is 47 inhabitants/km². The Highlands constitute about 45 % of the country's total area; they are home to 80% of the country's citizens and they support 70% of the livestock population.

The current life expectancy at birth is estimated at 50,7 years. The structure of the population reflects a high dependency ratio because 48,6 % of people¹¹ are economically inactive.

According to CSA (1998), only 23 % of Ethiopians above 10 years were literate in 1994, with a large discrepancy between the literacy rates in urban areas (69%) and in rural areas (15%). There are 83 languages with over 200 dialects falling in four main language groups; namely, Semitic, Cushitic, Omotic and Nilo-Saharan.

About 50 % of Ethiopia's population is food insecure, or lives below the poverty line. More than 40 % survive with less than one dollar per day. Moreover, only 10 % of the rural population has access to safe water supply. Both chronic and transitory problems of food insecurity are severe in Ethiopia. Transitory food insecurity arises from drought, conflict, and displacement of people. Chronic food insecurity results from low productivity, scant transport infrastructure and low purchasing power.

1.3.2 Economic overview

Ethiopia is one of the world's least developed countries. Its 1994 gross domestic product (GDP) was USD 6 108,60 million. The per capita income was under USD 120,00. The GDP's growth rate varied from an average of 6,0 % during the 1980/81-1990/91 period to 11,1 % during the 1992/93-1997/98 period (Source: MEDaC, 1999). Most of this improvement is due to the economic reform made after the political change in 1991.

The country's economy is heavily dependent on agriculture for generating employment, income and foreign currency. Agriculture accounts for 46 % of the GDP and as such is the dominant sector of the Ethiopian economy, providing 90 % of total exports. The major export items include coffee, oilseeds, hides, beeswax, and sugarcane. The contributions to GDP of the next two dominant sectors are 39,1% for services and 11,2 % for industry. Such high dependence of the economy on agriculture could add an additional factor to the vulnerability of Ethiopia to climate change.

¹¹ Age groups 0-14 years and 65 years and over

With about 73,6 million ha land suitable for cultivation (MEDAC, 1999) Ethiopia has considerable agricultural land resources, which could support a large population and provide enough food and other commodities required for the development of other sectors. The major problem of crop production in Ethiopia is its low productivity that can be attributed to several factors such as the absence of integrated diseases and pest control, heavy dependence on rainfall and shortage of irrigation water conservation and utilisation technologies. Moreover Ethiopian farmers depend on primitive crop varieties and outdated farm technologies resulting from the weak research and technological innovation and distribution capacity.

Small-scale farmers using low input/output rain-fed mixed farming with traditional technologies dominate the agricultural sector. The agricultural production systems in Ethiopia can be classified into five major categories: (1) the highlands mixed farming system, (2) the lowland mixed agriculture, (3) the patrol system, (4) shifting cultivation and (5) commercial agriculture. According to MEDAC crop production is estimated to contribute on average about 60 %, livestock accounts around 27 % and forestry and other sub-sectors around 13 % of the total agricultural value.

The present Government of Ethiopia has given top priority to agriculture and has taken a number of steps to increase the sector's productivity. The diversity of agro-ecological conditions enables Ethiopia to grow a large variety, of crops including cereals, spices and herbs, pulses (lentils, beans), stimulants (coffee, tea, chat, tobacco), fruits, sugarcane, fibbers (cotton, sisal), vegetables (onion, tomato, carrot, cabbage), root and tuber crops (potato, sweet-potatoes, beets, yams).

The 1994 agricultural sample survey indicated that the average yield/ha (all crops confounded) was 10 quintals, while that of cereals, pulses and other crops was about 10, 9 and 3 quintals respectively (CSA, 1995). The performance of crop production has been poor for the last three and a half decades. Food grain per capita had registered a downward trend for several years. Once self-sufficient in food production and a net exporter of food grains, Ethiopia has become a net importer of grain since 1981/82 (MEDAC, 1999).

1.4 Food Security and Consumption Trends

1.4.1 Food security

Agriculture, which includes crop production, animal husbandry livestock, forestry, fisheries and apiculture, directly supports about 85 % of the population in terms of employment and livelihood. It is the main source of domestic food supply, hence the prime-contributing sector to food security, and supplies around 70 % of the raw material requirement of agro-based domestic industries. Food security is the top priority for the Ethiopian Government that is engaged, with the support of partners and donors, into the preparation of a national food security strategy, which involves many stakeholders and the local people at large. Each regional state is also expected to prepare a regional food security strategy.

The strategies used by different groups in Ethiopia to cope with drought and the resulting food shortages depend on their natural environment and on the resources available at the household levels. Pastoralists, for example, use diversification into non-agriculture, particularly seasonal migration and non-farm employment to cope with drought. Wages earned constitute a large portion of the household incomes. The commercialisation of non-

wood forest products (including wild animal resources) is another important source of income and food for many rural Ethiopians, especially for those living close to the road systems.

1.4.2 Trends in food consumption

Forest products consumption and production consist of fuel-wood and charcoal, industrial round wood (veneers, sawn wood and plywood), wood-based panels (particleboard, fibreboard and plywood), and other products such as pulp and paper.

Despite their value, data on fuel-wood and charcoal production are not reported, and available combined estimates, based on the per capita consumption, are 1 m³ for rural households and 0,94 m³ for urban ones. It is therefore difficult to elaborate on energy consumption patterns and trends.

Detailed statistical information concerning round wood and industrial round wood is not available although existing data mention a decline in the production of logs from 130 000 cubic meters in 1980 to 20 000 cubic meters in 1996.

2. Forest Resources: Current Status and Management

2.1 Forest Inventory and Information Systems

The available information on the forest and other woody biomass vegetation cover is limited. This has been major impediment to planning and implementing sustainable forest management. The most recent national surveys of forest and land use are those carried out by FAO in 1984 and by CESEN in 1986. The results from these two surveys are now outdated. In 1990, the State Forest Conservation and Development Department, which carried out a desk study of the forest resource base, estimated the natural forest cover at 3,5 million ha. Most of these studies indicated that the climax vegetation has disappeared in most areas in the country.

The recent sources of information regarding forest and other woody biomass covers are from Reusing (1998) and the Woody Biomass Inventory and Strategic Project (WBISPP 2000):

- Reusing undertook a forest monitoring based on satellite remote sensing data to assess the depletion of Ethiopia's natural high forests during the last 25 years. The study showed that in the period 1973-1976 natural high forests covered some 4,75% of the country. The annual deforestation rate was calculated at 163 000 hectares;
- WBISPP, which started in 1990 and is still operational, is the main source of information for selected high priority zones, including natural and man-made forests, and dispersed tree cover in agricultural ecosystems. The project has developed a very comprehensive database in digital form covering natural resources, their use and management. The database includes, among others, the fuel-wood balances broken down to the woreda and household levels. It also includes total use of dung and crop residues as fuel, livestock forage supply, livestock carrying capacity, human food supply and consumption balances, and population support capacity. From the data analysis undertaken, a strategic plan has been developed for six regional states and the project is expected to cover the whole country, over an area of almost 1 million km².

In addition to these studies, the Ministry of Water Resources' Development conducted forest resources inventories in some of the river basins with the objective to develop integrated development master plans. The River Basin Integrated Development Master Plan studies for Abbay, Baro Akobo, Omo Gibe river basins possess information relative to forest cover, growing stock, status of forest resources and provide quantitative information on growing stock and volume. The forest resources management study in the South Western part of Ethiopia that is conducted by JICA is also another source of information for the high forests in south western Ethiopia covering an area of 2,7 million hectares.

2.2 Characteristics of the Forest Estate

Historical data indicate that about 42 million ha or the equivalent of 35% of the land area might have been covered with forests (EFAP, 1992). However, with the inclusion of the savannah woodlands, the estimation rises to some 66 % of the country. Forest decline has been evident from the facts that the forest cover estimated at 16% in 1950 has declined to 3,6 % in the early 1980s and to 2,7% in 1989. With the 5 million hectares of savannah woodlands, the total forest area covered 7 % of the country.

2.2.1 Total forest estate

Details on Ethiopia's main forest resources characteristics are given in Table 2. The forest cover, which is classified into natural forests (high forests, slightly disturbed, highly disturbed), woodlands, bush-lands, plantations, and farm forests, is estimated at 29,8 million ha¹². According to FRA 2000 however, natural forests and woodlands cover 31,5 million ha.

The 1978 Reconnaissance Inventory of the south and south western forests of Ethiopia is the only available source of information on the growing stock of Ethiopian natural forests. According to this inventory, the standing volume of trees measuring over 30cm dbh varied between 44 and 175 m³/ha for the economically useful species. The average volume per hectare ranged from 30-120m³/ha and 5-50 m³/ha respectively for closed high forests and open forests. The average of volume in the woodland type is about 10-50m³/ha. The annual incremental yield is 14,4 millions m³.

The JICA (2000) study in the south western part of the country gave an estimate for closed high forests of 320 m³/ha. The slightly disturbed forests have a stocking density of 182 m³/ha while the open forests contain 90m³/ha.

Table 2: Forest resources of Ethiopia

Forest Resource Types	Area	Growth Stock	Annual increments
Natural high forest	2,3 million ha	NA	
Slightly disturbed	0,7 million ha	90 -120 m ³	0,3 million m ³
Highly disturbed	1,6 million ha	30 -100 m ³	
Woodland	5,0 million ha	10 - 50 m ³	6,4 million m ³

¹² Farm forests non-included

Bush-land	20,0 million ha	5-30 m ³	4,0 million m ³
Plantations	0,2 million ha	NA	1,6 million m ³
Farm forests	NA	NA	2,1 million m ³
Total	29,8 million ha*		14,4 million m³

Source: EFAP, 1992. * Excluding farm forests

The forest cover change in Ethiopia is mainly due to the transformation of natural high forests to cultivated land and grassland, especially in the more densely populated northern and north eastern parts of the country. Today, remaining blocks of forests exist only in the south and southwest of the country. There have been different estimations of forest cover change in Ethiopia. These contain important discrepancies as indicated in the available figures below:

- FAO (1999) estimated forest cover change in Ethiopia to be about 62 000 hectares per year;
- EFAP¹³ (1994) estimated 150 000-200 000 hectares of forest loss per annum;
- WBISPP¹⁴ (2000) estimated 59 000 hectares from three regions with better forest cover;
- Reusing (1998) made an estimate of 163 000 hectares of forests only from the high forests of the country, and concluded that, between 1973 and 1990, the area coverage of closed forest stands had been reduced from 2,64 % to 0,2 %. On the contrary, the heavily disturbed high forest, which was only 0,87 % in 1973-1976, increased to 3,08 % in 1986-1990.

In terms of degradation, the high population growth rate and the subsequent rising demands for crop and grazing land, construction materials, fuel-wood and charcoal are the main factors responsible for the decline of forest areas in Ethiopia. In addition, low agricultural productivity, low standard of living, lack of alternatives, and lack of appropriate land use and forest policies have all aggravated the situation. The species composition and the tree density have been decreasing in almost all forested areas, which consist now mainly of deformed and over aged trees. Natural regeneration is scarce due to the high impact of livestock.

2.2.2 Natural forests

Ethiopia's remaining natural forest cover includes various montane forest types concentrated in the less populated south and southwest regions. The humid, mixed forests occur in the south, with species such as *Podocarpus falcatus*, *Croton macrostachys*, *Olea africana*, *Schefflera abyssinica* and *Hagenia abyssinica* at higher altitudes. In the southwest, *Aningeria adolfi-friederici* is the main emergent broad-leaved forest species; it reaches 40 m in height. Bamboo (*Arundinaria alpina*) is found in clumps within the high forests. There is also *Oxytenanthera abyssinica* or the low land bamboo. The central and northern parts are almost completely deforested. The latest estimate of the remaining area of closed high forests is 4 120 000 hectares or 3,37 percent of the country (Source: WBISPP, 2000).

¹³ Ethiopia Forestry Action Programme

¹⁴ Woody Biomass Inventory and Strategic Project

Woodlands and bush-lands are largely restricted to the agro-pastoral and pastoral zones. The lowland woodland includes species of various *Acacia*, *Boswellia*, *Commiphora*, *Balanites*, *Euphorbia*, *Combretum* and *Croton*.

2.2.3 Planted forests

Plantation programmes have been initiated on a large scale in a few NFPAs to rehabilitate formerly forested areas and produce construction and domestic energy wood. Plantations are mainly of exotic tree species with *Eucalyptus* covering the largest area of hardwood plantations. The emphasis is on fast growing species short rotation plantations, while little is done to grow valuable indigenous trees because of their slow growth rate and low economic return. Indeed, very few species with a high market value such as *Podocarpus*, *Juniperus*, *Cordia* and *Aningeria* were utilized. Plantations include industrial and peri-urban afforestation man-made forests established and operated by the government, as well as community woodlots and plantations for watershed protection.

The total area of planted forests is 255 000 ha (Source: Bekele, M. 2000: Review and improvement of data related to wood productions...). It comprises 76 050 ha of industrial plantings, where *Eucalyptus* and *Cupressus* species are dominant, covering 58 % and 29 % of the area respectively. *Juniperus procera* and *Pinus spp.* cover respectively 4 % and 2 % of the area, while other species represent 7% of the industrial plantations' estate. There are also 179,164 hectares of plantations for the production of fuel-wood and poles. Farmers and communities have established 79 500 ha, while 99 664 ha represent public sector's plantations for fuel-wood and pole production. Peri-urban plantations are also established to supply urban centres with poles and fuel-wood. They are mainly located around Addis Ababa and other major towns. In order to meet the increasing fuel-wood demand, the Ethiopian Government, with the support of partners/donors, has launched several projects, implementing over 40 000 ha of fuel-wood plantations.

The assumption that trees prevent erosion underlies the reforestation strategy that currently prevails in Ethiopia. The annual planting rate is estimated at 17 000 ha, which is 10 % of the annual deforestation rate. (EARO¹⁵ 2000) If this planting rate remains the same, the area of industrial plantations would be around 500 000 hectares by the year 2020. Many of the plantations established suffer from low or poor management practices and would probably not yield the expected products and services.

Projections of the future contribution of forest plantations to industrial wood supply made by EFAP indicate that the incremental yields will reach 1,1 millions m³. Gains in productivity of forest plantations through improved management and tree improvement are expected to materialise in 2020. The likely sustainable fuel-wood supply from all forest types is 8,8 millions m³ without any intervention, but the projected supply would reach 21,8 million by 2014, with proper management (EFAP, 1994).

2.2.4 Trees outside forests

Trees outside forests (TOFs) are important sources of wood and non-wood forest products (NWFPs). Households' main fuel and construction wood needs are obtained from trees

¹⁵ Ethiopian Agricultural Research Organization

planted along roads, in and around fields, around homesteads and in windbreaks. The area covered by TOFs is not known, but according to WBISPP (2000), there is a very significant increase in on-farm tree planting, as a result of the change of state policy on individual tree tenure.

The MOA (1998) estimated the supply of fuel-wood from farm homesteads at about 80 000 tons per year, based on an assumed number of five mature trees per rural household. The same source indicated that there are some 140 000 hectares of woody vegetation in patches less than 200 hectares in size that are contributing nearly 100 000 tons of fuel-wood per year.

The development of a future forest policy in Ethiopia should take into account the potential of trees outside forests for they constitute a valuable source of building material and firewood.

2.3 *Tool box for Sustainable Forest Management*

2.3.1 Criteria and indicators for sustainable management

Management criteria for sustainable forest management have been developed within Ethiopia's Forest Action Programme (FAP), but have not been implemented. According to FAP, natural forests are primarily used for conservation, commercial utilisation being a secondary objective. Two million ha of natural forests selected in priority for development could not be effectively administered. Management plans were prepared for eight forests, but only two were brought into being. Generally under-stocked, forests have an estimated mean annual incremental (MAI) well below the optimum. The national forest programme has proposed 60% of the natural high forests to be under conservation while 40% is intended for production purposes.

2.3.2 Management Planning and harvesting practice

For the past two and a half decades the public sector has been responsible for the management of forest resources. This resulted in uncontrolled deforestation of the natural forests, encroachment by the farmers and desertification.

Regional bureaus have now managerial responsibility over planning, utilising and developing natural forests, woodlands and state-owned plantations. Though management plans rest on regional bureaus of agriculture, no concerted management planning effort has been made, except for the formulation of eight management plans. The legal status of forest areas has not yet been regulated, thus leading to increased encroachment and depletion of the forest resources.

The forestry administration both at federal and regional levels is trying to develop a management system that would minimize any further destruction of natural forests, balancing protection objectives with productive interests of the state and local communities. The lower status given to the forestry sector both at the federal and regional levels has affected the management of the resources. Besides, there are no responsible institutions placed at (forest) field level and no institution is established to ensure the management and conservation of the country's forest resources. With respect to wildlife, the management of protected areas is

planned to be a participatory endeavour, allowing the sharing of grazing, of water resources and of revenues generated by the forests and tourism.

Poor logging practices and techniques carried out in natural forests added to the narrow range of tree species' selection have contributed to the rapid depletion of the best forest resources. The average saw-log volume per hectare is 50 m³ out of a potential of 200 m³ per hectare. There is also a great loss of energy in producing charcoal by the widely practised earth mound kiln technique that results in 50 % of waste. Approximately, 6% of the gross supplies of wood are converted to charcoal.

Certification has not been a strategy in Ethiopia for the sustainable development of forest resources.

2.4 Forest Production and Forest Industries

2.4.1 Wood products

Although precise figures are not available, it is estimated that about 24 million m³ of wood is harvested annually, of which 90 % is used as fuel-wood and charcoal and the remaining 10 % for industrial and building purposes (EFAP, 1994). Households demands for forest products in many areas exceed by far the mean annual volume increment of the natural forests.

Industrial wood

One of the lowest of the world in terms of production and consumption, Ethiopia's industrial round wood is mainly secured from non-coniferous trees. The production of logs has declined from 130 000 m³ in 1980 to 6 000 m³ in 1999 (MOA, 2000). The production of sawn wood averaged about 23 000 m³ per year from 1980 to 1990. The production of wood-based panels is estimated at 12 000 m³ with an average import of 1000 m³ per annum. The production of veneer sheets has declined from 153 000 m³ in 1986 to 82 000m³ in 1996, while that of paper and paperboard has been in the range of 7 000 to 9 000 metric tons from 1993 to 1999. Imports of pulp have increased to reach 6,5 metric tons at present. The average annual production of plywood is 3 000 m³ and that of particleboard has increased to 7 466 m³ in 1997.

External trade in wood products does not exist. The country imports many forest products as sawn wood, veneer sheets, wood based panels, wood pulp and paper products.

Construction and home products

Forests are the main source of Ethiopia's building materials. Given the steady population increase, this poses a real threat to the fragile forest ecosystems. Construction products include poles, withies¹⁶ and traditional ropes. In the construction process withies are tied across the erected poles using either traditional ropes or other tying material to complete the framework structure before plastering the walls with mud. Generally most of the species used to provide building poles are also used as sources of withies.

¹⁶ Small trees of about 3-cm dbh

Forests also supply a wide variety of household items, including beds, brooms, pancake discs, cooking spoons, handles, mats, mortars, stools, trays, baskets, walking sticks and clubs. Handles for tools form the largest portion, followed by trays and baskets. Items like mortars, beds, stools or chairs that demand more wood have quite long useful life, suggesting that the pressure they exert on the forests poses a lesser threat to the ecosystem than other uses such as building materials. Customs, beliefs, lifestyles of the ethnic groups tend to influence the use of forest products. Examples are the big Jimma chairs made of one-piece of trunk, or the less voluminous ones made in Gurage zone.

2.4.2 Fuel-wood and charcoal

Traditional biomass fuels such as wood, agricultural residues, charcoal and animal dung are the dominant energy sources of Ethiopia. The household sector accounts for about 93% of the biomass fuel consumption and there are ample signs of shortages of fuel-wood in both urban and rural areas.

Most households depend almost exclusively on wood to meet their energy needs. The country's average per capita daily fuel-wood consumption varies from 7 kg in the biomass rich regions to 0,8 kg in the arid areas (Cesen). More than 50 % of all primary energy used is for baking Injera, a sort of large pancake, which is the country's main food item. This energy intensive activity accounts for more than 75% of the total energy consumed in Ethiopian households. The relative importance of various energy sources used in urban and rural homes is given in table 3.

Table 3: Urban and Rural household energy consumption by fuel type

Energy Sources	Relative consumption	
	Urban	Rural
Fuel-wood and Charcoal	74,7 %	82,2 %
Dung	7,8 %	9,4 %
Agricultural Residues	6.3 %	8,4 %
Kerosene	7,6 %	-
LPG	0,6 %	-
Electricity	3,0 %	-
Total	100 %	100 %

Source: WBISPP. 2000

Natural forests and woodlands are the most important sources of woody biomass resources. An estimated 38 million m³ of fuel-wood was consumed in 1995/96. However, there are huge variations in the per capita energy consumption depending on the availability of woody biomass resources or other alternative options. For example, in the forest-void northern part of the country, consumption is relatively low. On the other hand, daily consumption rates in the southwest may be higher than 5 kg/capita. WBISPP (1998) showed that in 57 % of the high forests the consumption exceeds the MAI, while it is equal to MAI in 9% and is lower than MAI in the remaining 34 % of the high forest area.

Table 3 reveals that the fuel mix in urban areas includes also commercial fuels whereas in rural areas it is only limited to traditional fuels i.e. woody biomass, cow dung and agricultural

residues. Biomass fuels are readily available and rural households do not pay direct monetary price for their use. This situation is perhaps responsible for the very inefficient and wasteful use of energy there. However, with the increase in the commercialisation of traditional fuels, there are indications that some rural households are also paying money for their supplies in parts of the country where fuel-wood is scarce.

Currently, the Government's efforts are concentrated in improving household energy utilisation efficiency and in promoting wider use of commercial fuels such as electricity, kerosene and LPG. The GTZ-Household Energy/Protection of Natural Resources Project is promoting improved stoves that can reduce the fuel consumption by 50 %. This project covers four selected regional states (a total number of 17 zones and 30 towns) with the objective to produce and disseminate improved Mirt stoves for Injera baking to the farming communities as part of the national strategy for the conservation of forest resources. The project is involved in the training of stove producers and in the establishment of stove production facilities. By the end of 2001, the project has helped to produce 3 114 Mirt stoves in Amhara region, 5 257 in Oromiya, 2 746 in Southern Nations and 286 in Tigray region.

2.4.3 Non-Wood Forest Products

Ethiopia's main NWFPs include food products (Nuts, fruits, vegetables), spices and condiments (Nutmeg, Cinnamon, Cardamom), industrial plant oils waxes, plant gums (Frankincense, gum Myrrh), natural honey and beeswax, medicinal plants, animals and animal's products (game, skins, bones). The most important ones are Incense from *Boswellia* tree species, honey, bamboo, Arabic gum, medicinal plants and food products. However this ranking can show a variation at local levels. Some of these NWFPs (honey and about half of the officially traded volume of gums and incense) are exported.

Despite this potential, there is no single national or regional organisation responsible for the collection, management, study and documentation of NWFP resources in the country. The role of these products in rural communities is poorly documented and little understood. However, NWFPs such as gums and incense, resins and spices, or honey and wax from bee keeping, do play an important role in Ethiopian rural communities' consumption patterns and income diversification.

Food products

Food products from Ethiopian forest areas are not well documented; they include nuts, fruits, vegetables, spices, and condiments such as ginger, nutmeg, cinnamon, and cardamom. Forest food products also include mushrooms whose potential remains largely under-utilised. These untapped resources should be explored for they can contribute significantly to food security in Ethiopia.

Edible wild plants are more important in the diet of many rural people during times of food shortage, when their consumption is the only available alternative to survive. Moreover, in harsh environments, people have the opportunity to collect wild-food almost throughout the year.

Incense

Frankincense gums are used as fumigation agents for religious purposes and traditional coffee ceremonies. They are also used as fixatives for chewing gum, flavours and fragrances in

perfumery and have pharmaceutical uses as anti-inflammatory remedies. Frankincense¹⁷ generates rural incomes and employment, particularly in northwest Ethiopia where it originates. It is mainly obtained from *Boswellia papyrifera*, which is found in Tigray, Gonder and Gojjam. Other similar resin-yielding species are *Boswellia ogadensis*, *Boswellia rivae*, *Boswellia sacra* and *Boswellia freericana*. The potential production is believed to reach 23 000 tons. Ethiopia is one of the world's leading producers of Olibanum with a production of 1 500 tonnes/year between 1978 and 1991.

The Natural Gum Processing and Marketing Enterprise (NGPME), under the MOA, uses contractors or buys the gum directly through its eleven branch offices, each located in one of the important gum-producing areas. The NGPME takes care of cleaning, processing, transporting and marketing of the final product. During the 1996-2000 period Ethiopia exported 2 715 tons of gum mainly to Germany and France, and earned more than 28,7 million ETB (Ethiopian Birr) equivalent in foreign currency.

Arabic gum

Arabic gum is another important NWFP obtained from *Acacia senegal* that covers important areas in northwest Ethiopia, along the Sudanese border. The annual production of Arabic gum ranged between 350-400 tons between 1988 and 1994. Apart from gum, *Acacia senegal* also yields construction timber, fuel-wood and dry season fodder from leaves and pods. A gum of lower quality is also obtained from natural stands of *Acacia seyal* growing in the rift valley depression, or from *Acacia polyacantha* and *Acacia drepanolobium*.

Honey production

Honey production is very important in Ethiopia, which has diverse and unique flowering plants that support an estimated 4-10 million traditional beehives (producing each about 8 kg of honey annually) and another 10 000 modern box hives. The identified annual honey production is estimated at 24 000 tons, i.e. about one third of the total honey production in Africa (CSE, 2001).

Honey is devoted to local consumption, with around 20 % of the production used as table honey in rural areas, 55-60 % used in the production of Tege¹⁸, and the remaining sold in Addis Ababa. The total national income from honey and beeswax is estimated at USD 15 000 to 18 000. (FAO, 2001)

Essential oils

Essential oils have been used for thousands of years in perfumes, medicines and food flavouring. A more recent innovation is their application in bio-pesticides. Traditionally pure oil is prepared for medicinal purposes, for tanning leather and wood, and for greasing the hair and body. Otherwise oil-bearing plants play an important role in the traditional nutrition of Ethiopians. Their seeds are consumed entire, usually by low-income people and on fasting days. They are often the major source of energy, proteins, of fats and of fat-soluble vitamins.

The most important oilseed species include *Gossypium* sp. (cotton), *Guizotia abyssinica* (Niger), *Linum usitatissimum* (linseed), *Brassica campestris* (rapeseed), *Sesamum indicum* (sesame), *Arachis hypogaea* (peanut), *Carthamus tinctorius* (safflower), and *Ricinus*

¹⁷ Also named gum Olibanum

¹⁸ A local beverage

communis (castor). The main production areas are Bale and Arsi, East Welega, Tigray and Lake Tana in northwest Ethiopia. Subsistence farmers in the highlands produce the majority of oilseeds in Ethiopia.

Wax production

The production of wax estimated at 3 200 tons/year is mostly exported, generating over USD 235 300 per annum to the national economy during the 1984-1994 period (FAO, 2001).

Bamboo

Bamboo resources cover an estimated one million ha of highland and lowland in Ethiopia (Luso Consult, 1997) and are a source of food, fodder, furniture and building materials. They could also be used as raw material for fiber board factory, pulp and energy requirements. However, the use of bamboo resources in Ethiopia is currently mostly limited to housing construction, fencing and for the production of furniture, baskets, agricultural tools and house utensils.

NWFPs of wild animal origin

These NWFPs could contribute significantly to food production and household food security. However, because the Catholic Orthodox religion forbids the consumption of many wild animals, Ethiopians do not eat pigs, donkeys, horses, snakes, rabbits, rats, etc. Nevertheless, in some lowland areas of the country (Oromia, Borena), hunting contributes to food security by providing meat for consumption and cash income.

The country has a large potential for “wildlife production systems” that include wildlife ranching and domestication. The organised development of these promising activities that include also tourism would contribute to food security and to poverty alleviation. Game hunting is another activity with considerable potential in Ethiopia where large herds of big antelopes, gazelles and warthogs exist.

In terms of production, civet and ostrich farming are the activities generating the most revenues. Civet farming is currently active in parts of the western highlands and Sidamo where civet musk is produced for the perfume industry. There is in average, 15 civets/farm that produce each about 1 kg of musk annually worth about USD 165 00. Ostrich farming provides also interesting revenues in a pilot project in Abiata Shala National Park in Oromia through the sale of ostrich meat and feathers.

Medicinal plants

They constitute the major medication products available to a large majority of Ethiopians who depend heavily on forests, woodlands and cultivated lands to meet as much as 75-90 % of their requirements for primary health care (Deffar, 1998). The country has indeed, a long history of traditional healthcare based largely on rich pharmacopoeia drawn mostly from plants. These are used in self-administration by female household members, or under prescriptions prepared by traditional health practitioners and healers. Women use *Moringa sp.* to purify drinking water and, hence contribute to improving the health of their communities. *Balanites aegyptiaca* fruits contain saponins, which are used to kill both the snails that host bilharzias and the water fleas that host the guinea worm. Knowledge on plants that treat most common diseases in an area is shared by most of the household members, making it necessary to consult a specialist only when the case is complicated.

Medicinal plants comprise more than 600 species that represent about 10 % of Ethiopia's vascular flora. Table 4 presents a list of the most commonly used medicinal plants in Ethiopia.

Table 4: Commonly used Medicinal Plants in Ethiopia

Scientific names	Diseases treated	Parts of plant used
<i>Calendula officinalis</i>	Haemorrhoid	Leaves
<i>Eucalyptus globules</i>	Skeletal muscle-problem	Leaf oil
<i>Matricaria chamomile</i>	Headache	Leaves
<i>Rosmarinus officinalis</i>	Nerves (partially paralysis)	Whole plant
<i>Datura stromnium</i>	Chronic cough, asthma	Seeds
<i>Marubium vulgaris</i>	Hepatitis	Leaves
<i>Verbascum haemorroide</i>	Eye disease	Leaves
<i>Ricinus communis</i>	Skin disease	Leaves, seed and fruit
<i>Cynara scolymus</i>	Hepatitis	Leaves
<i>Coriandrum sativum</i>	Hepatitis	Fruits, leaves
<i>Taraxacum officinal</i>	Hepatitis	Fruits, leaves

Source: Desalegne Desissa, 1997.

Other common medicinal plants include *Hagenia abyssinica*, *Croton machrostachys*, *Tamarindus indica*, *Bersama abyssinica*, *Olea africana*, and *Doviyalis abyssinica*. The efficacy of *Hagenia abyssinica* and *Glinus lotoides* for the treatment of tapeworm, and that of *Phytolacca dodecandra* for the control of schistosomiasis has been scientifically determined, but the safety and efficacy of many others in the treatment of various diseases remain to be investigated.

2.5 Status of Forest industries

2.5.1 Present state of forest products' industries

The major constraint to developing wood-based industries lies within their limited capacity to supply more industrial wood products¹⁹ on a sustained basis. This results from a shortage in raw materials, the low performances of wood-based industries, organizational and managerial problems, which are related to policy issues. The main wood industrial infrastructure includes the following:

- Nine mobile sawmills, seven of which belong to a public enterprise and two are owned by the private sector; they process logs harvested from planted forests and trees outside forests;
- Forty-eight old fixed sawmills that convert large saw logs of indigenous species with a 55 % average recovery rate;
- Two old plywood mills that operate with a 35-40 % recovery rate and, which have an average annual output of 2500 m³;

¹⁹ Sawn wood, wood based panels *i.e.* plywood, particle board and fiber board

- One fibreboard mill with a capacity of 1500 m³/year and two particle board mills with a combined annual output of 4500m³;
- One paper mill in Nazareth that uses local raw materials as well as imported pulp and wastepaper. The average annual production has been 9500 metric tons. (Bekele, 2000)

Ethiopia's per capita industrial round wood production and consumption is among the world's lowest. The current annual national demand for industrial wood is about 400 000 m³; it should increase to reach 1,6 million cubic meters by the year 2014 (EFAP, 1994, cited by Bekele, 2000). The annual demand for construction wood is estimated to be 2,1 million m³, and is anticipated to reach 4,2 million m³ by the year 2014 (Bekele, 2000)

The woodcarving industry is seriously threatened by the low availability of raw materials, especially indigenous hardwoods that are also valued for construction, furniture and fuel purposes. Currently, carvers practice selective harvesting that has a severe impact on forest structure and species composition, as increasingly immature trees are being cut.

2.5.2 State of supply and demand of forest products

As indicated earlier, about 24 million m³ of wood are harvested annually from natural forests. Overall, 80% of this wood is consumed as household fuel (firewood or charcoal), another 10% as building material and transmission poles, leaving the balance for other uses. The annual demand for wood, as measured by annual extraction of timber and wood products, exceeds the annual growth and exerts heavy pressure on the remaining forests.

Firewood is the most preferred domestic fuel in both rural and urban areas, and accounts for the bulk of the wood used. Indeed, most Ethiopian families rely heavily on fuel-wood from the forests to fulfil their domestic energy requirements estimated between 49 and 64 million m³ per year for the country. Despite the present huge shortage in supply of energy wood, the projected demand for fuel-wood and building poles is increasing and the supply is expected to decrease even farther below the demand. Wood provides some 78 percent of all energy consumed in the country, with an average yearly consumption estimated at 1m³ per capita for the rural households.

More than 90 % of the domestic supply of industrial wood and firewood comes from natural forests, which are the main source of wood products. Projected demands for the year 2000 were about 1,5 million m³ for saw logs, 47 000 m³ for ply logs, 4,5 million m³ for construction wood, and 61 000 m³ for telecommunication poles. The projected industrial wood demand supplied from both natural and man-made forests was around 338 000 m³. It has been estimated that the supply of construction wood will decline to 936 000 m³ in 2014. It is interesting to notice that there has been a major shift in consumption from hard wood logs, to softwood ones.

2.6 Economic and Social Significance of Forests

2.6.1 Forestry's economic and social contribution

The formal economic contribution of trees and forests is rather insignificant. Indeed, through the 1982-1992 period, the agriculture sector accounted for 45 % of the total GDP, and over

the same period, forestry accounted for about 5,5 % of the agriculture sector and 2,5 % of the total GDP (EARO, 2001). These figures, however, underestimate the total contribution of the forestry sector to the country's economy for lack of economic data and valuation methods of the forest resources. The non-marketed forest products and environmental and social services of trees and forests are not reflected in national accounts.

The main economic and social roles of forestry are the supply of wood for energy and of raw materials for wood based and construction industries.

2.6.2 Forestry's relative contribution to employment and revenue generation

As in many other developing countries, whenever people have relatively unrestricted access to forests, income from forest products is often more important for the communities' poorer groups. Because they are able to combine many of the wood-related activities with household tasks, women account for roughly half the number of proprietors of, and workers in forest products harvesting, processing and marketing.

Women are also involved in basketry and in commercialising forest products at the village level, whereas men are responsible for woodcarving and for selling forest products outside the village, in both rural and urban markets. The difference between the roles of men and women is illustrated in the following: Whereas women collect firewood and gather food-plants, it is men's responsibility to fetch building materials. However, both men and women collect medicinal plant parts.

Gathering, processing and selling of various forest products provide alternative income sources. Most forest-based activities follow the seasonal patterns of agricultural cycles, and are important in periods of hardship when cash is scarce following crop failure. The specific products involved vary according to regions, depending on markets, local traditions and types of forest assets available. These activities benefit local communities, but remain small in size; they are labour-intensive and household-based, often accessible to the poorer sectors of society because they necessitate few capital inputs.

In 1988-1989, forest industries in Ethiopia employed about 2,2 % of the country's total workforce and contributed 2,8 % to employment in the agricultural sector. During the 1993-94 fiscal year, the manufacture of wood products, furniture, paper and paper products employed 6 180 people. The forestry sector employs directly some 35 000 persons in government and industry branches, and some 400 000 persons in commercial fuel-wood harvesting, processing and distribution (EARO, 2000). Nationwide 20 000-30 000 seasonal workers are employed annually in tapping and grading Olibanum in the remotest parts of Ethiopia. Around 1 781 organisations employing 14 000 workers are involved in wood-related activities in Addis Ababa alone (MOA, 2000).

Regarding revenues, the wildlife sector generates cash from sport hunting, live animals' export and tourism. The annual revenues collected from hunting during the period 1996-2000 are estimated at USD 530 000. The export of live animals has contributed to over USD 235 000/year during the same period (Bekele, 2000). NWFPs contribute significantly to revenue generation as indicated in table 5.

Table 5: Revenues from Exports of selected NWFPs in thousands ETB

Type of product	Revenues/product/year ('000 ETB)					
	1995	1996	1997	1998	1999	2000
Incense and gum	8 294,2	12 300,39	21 000,63	15 000,9	18 000,02	24 000,68
Natural Honey	5,13	31,67	135,2	35,616	216,21	28,08
Korerima	133,2	158,2	161,4	286,49	424,68	227,17

Source: MOA, 2002.

Income from agricultural production alone is not sufficient and so diversification of income through the promotion of forest products and forestry activities has become significant. There has been increasing interest in the contribution that forests make as a source of local rural employment and income.

2.6.3 Other social functions of forestry, including food security

The contribution of Ethiopia's forests and trees to the country's food security is significant, diversified and valuable. It ranges from direct supply of domestic cooking energy and food items, to provision of jobs and revenues. Many households, both in rural and urban areas, depend on fuel-wood for domestic energy supply, wild medicinal plants for health care, and various food-plants for food security. However, these contributions are unsustainable because the resources are not properly managed for lack of research susceptible to generate improved forest technologies.

The contribution of honey, ostrich farming, game hunting and eco-tourism, bamboo, natural gum and medicinal plants to food security is undeniably significant. However, about 50-60% of the Ethiopian population is faced with chronic food deficits as food availability keeps declining over the years. Chronic food insecurity in the arid and semiarid zones is gradually expanding to some of the moist and humid zones due to severe land degradation.

2.7 Environmental Values of Forests

In addition to having numerous industrial and socio-economic values, forests and woodlands in Ethiopia have many environmental functions. They constitute a valuable repository of biodiversity in terms of genetic, species and habitat resources. They also provide important hydrological and soil protection functions.

2.7.1 Biodiversity conservation

Ethiopia owes its remarkable biological diversity to the favourable eco-geographic conditions that prevail. The flora comprises 6 500 - 7 000 species, of which 12 % are considered endemic, mainly in the Ogaden region, and in the western and south western woodlands. The forests host the major portion of the flora including about 25 % of families of close relatives of cultivated crops.

The Government of Ethiopia has devoted important efforts to the conservation of the country's biodiversity, including the formulation of policies for the sustainable use of genetic resources. Protected areas cover 14 % of the country and contribute significantly to conserving the diversity of the forest genetic resources, as is the case for the *in situ* conservation of wild coffee in the south-western part of the country. There are 40 wildlife conservation areas in Ethiopia comprising 9 national parks (2,3 million ha.), 4 wildlife sanctuaries (1 million ha), 8 wildlife reserves and 18 controlled hunting areas. Seven of the national parks are located in the lowlands while two are in the alpine highlands. Only two of these parks are gazetted.

The Institute of Biodiversity Conservation and Research (IBCR) is responsible body for conserving the country's biological resources. It has collected and stored about 804 accessions of seeds of 14 tree and shrub species. With German financial assistance, the IBCR has launched a Forest Genetic Resources Conservation Project the goal of which is to contribute towards developing and sustaining the economic, socio-cultural and ecological values of forest ecosystems.

2.7.2 Soil and water protection

Forests offer protective functions and maintain soil fertility by improving soil structure and thereby play a major role in sustaining agricultural production systems. Trees and shrubs also contribute directly to the reduction of soil erosion by taking part in soil organic matter build-up and improving soil fixation by developing extensive root systems. They contribute to water resources conservation by limiting run-off and increasing soil water intake, thus improving water resource availability. In addition, they contribute to improved agricultural practices by providing shade and shelter to crops and animals. In agricultural and grazing land, trees and shrubs can increase both crop and livestock production by reducing wind speeds and water loss.

Forests and trees lessen the impact of rainfall, allowing water to percolate instead of being lost through run off. In areas receiving an annual rainfall of 600mm per year, afforestation of 1 ha of steeply sloped eroded land allows an estimated 5000 m³ of water to seep into the ground thus preventing the filling up of waterways and the incidence of floods on rivers, lakes, dams and infrastructures.

2.7.3 Other values

Forests and woodlands also offer preferential environments for religious purposes. In fact, in Ethiopia, churches are usually built within forested areas that remain protected throughout ages. Many remnant forests of Ethiopia are in the vicinity of churches or sanctuaries.

Forested areas around big cities provide recreational grounds for people and contribute to cleaning up atmospheric pollution.

3. The Forestry Sector

3.1 *Institutional Framework of Forestry*

The forestry sector in Ethiopia has undergone fundamental changes as a result of reforms, which have allowed moving from a central planning economic system to a market-oriented one. This has brought about a decentralisation of the decision-making process and the re-organisation of ministries at national and regional levels.

3.1.1 State institution related to forestry

The following state institutions are directly or indirectly involved in forestry development and conservation of forest resources.

Following the dissolution of the Ministry of Natural Resources Development and Environmental Protection in 1995, the forestry sector is confronted by macro-economy related problems and other factors like the reorganisation of its institutional systems. Forestry currently falls under a large ministerial department, the Ministry of Agriculture under which it has a lower hierarchical profile. The MOA is in charge of the conservation, development and rational utilisation of forest resources at the federal level. Decentralized Regional Bureaus of Agriculture hold the same responsibilities at the regional levels. The whole forestry sector is administered under the Department of Natural Resources Development and Regulatory Department of the MOA. At the regional levels, the institutional framework for forestry varies from region to region but in all regions, forestry is at a lower profile.

The trend towards decentralisation and devolution of forest management tasks to the local governments is ineffective because these local administrations have little capacity to shoulder such challenging responsibilities. Moreover, budget allocations and staff resources are often inadequate to monitor forest resources effectively and to ensure sustainable management.

Other institutions directly or indirectly involved in the conservation of forest resources are:

- The Environmental Protection Authority in charge of environmental matters, including monitoring, protection and environmental information linked to forests, woodlands, bush-lands and all forestry-related resources and assets;
- The Water Resources Development Ministry that is responsible for water resources' sustainable development;
- The Ministry of Education involved in environmental education;
- The Ministry of Mines and Energy involved in energy resources development;
- The Ethiopia Agricultural Research Organisation responsible for conducting research related to agriculture and forestry;
- The Institute of Biodiversity Conservation and Research (IBCR) in charge of conservation and development of biological resources, including forest biological resources.

3.1.2 The private sector and forestry

Due to the comparative long-term nature of investments in forestry, private investors are little attracted in forestry development activities, but are more involved in harvesting, processing and marketing of forest products.

The government of Ethiopia has formulated policies to encourage private involvement and investment in forestry development. It is leasing land outside farmers' possession to the private investors that are willing to engage into activities that contribute to the improvement of the environment. So far, eight investment projects in forestry are currently operating with a capital outlay of 17,29 millions ETB.

3.1.3 Forestry research

The Government of Ethiopia has acknowledged the importance of research and the various problems encountered in the agricultural research system. It has accordingly enacted in 1997, a proclamation establishing the Ethiopian Agricultural Research Organization (EARO). The mandate of research in forestry has been given to the Forestry Research Centre (FRC), which is organised under EARO.

The FRC is responsible for generating appropriate technologies for the development, sustainable utilisation and conservation of trees and forests. Research priority setting and the National Forestry Research Strategic Plan have been established and developed with the active involvement and participation of all stakeholders. Among the proposed national research programs, of prime concern are forest plantations, farm forestry including trees outside forests, non-timber forest products and biomass-based energy. The forest plantation and farm forestry research objectives are respectively:

- Forest plantation research: generate technologies that enhance sustainable plantation development and management to alleviate wood shortage and rehabilitate degraded lands;
- Farm forestry: develop improved, diversified and sustainable production technologies that reduce poverty and are biologically, economically and ecologically viable.

3.1.4 Forestry training

Forestry training was initiated rather late in Ethiopia. First forestry training institute, the “Wondo Genet College of Forestry” introduced its earliest training programme at Diploma level in 1978. Currently, the college is under the Debu University in the southern region; it provides forestry training at MSc. level. The Alemaya University of Agriculture that used to provide training in forestry at BSc level has been transferred to the Wondo Genet College of Forestry, where curricula are now provided at PhD level with the support of the Swedish University. The number of graduate foresters is still below what is needed to carry out the challenging responsibilities of managing the forest resources of the country.

Training is the responsibility of the Ministry of Education. Budgets are mainly provided by SIDA (Swedish International Development Agency) that assists the sector since 1978.

Expenditures for training from 1997 to 1999 are estimated at 3 962 000 to 16 950 000 ETB (MEDAC, 2000).

3.2 Forestry Planning and Legal Framework

3.2.1 Central planning mechanisms

Recent changes in the forestry policy and institutional framework have emphasized the need to reduce the governments' role in productive activities, stressing decentralisation in forest management and administration with special attention given to participation. However, the Federal Government ministries are still responsible for policy issues, for preparing plans and budgets, and conducting studies and research. They also ensure enforcement of laws, regulations and directives of the Government, and provide for technical assistance.

3.2.2 Decentralized planning

The Regional Agricultural Bureaus are responsible for the preparation of plans and budgets for their respective regions. The Regional States have power to raise their proper revenues and plan their own development activities and programmes, following the policies of the federal government. Decentralization and devolution extend to the lowest level of formal state structure within the regions. Planning and annual budget preparation, are based on the assessment of economic situations, including the estimation of revenues.

3.2.3 Legal, customary and regulatory instruments

Ethiopia has reached significant achievements in terms of elaboration of a framework to address issues related to deforestation and land degradation. The Environmental Protection Authority has developed a National Action Plan to Combat Desertification with priority set for specific areas in 40 administrative zones of the country. Financial and technical assistance from UNSO, IGAD and the CCD Secretariat supported the formulation of this plan that will be implemented by the various relevant federal and regional executive organs.

3.3 External support and international commitments

Several countries and international organisations provide financial and technical assistance to the Government of Ethiopia in planning and implementing its forestry programme. Following are the objectives of on-going projects benefiting from international multilateral or bilateral support.

3.3.1 International multilateral support

Global Environment Facility (GEF) supports the following forestry-related projects in Ethiopia:

- The regional “*Conservation and Sustainable Use of Bio-diversity in the Greater Rift Valley Lakes of Ethiopia, Kenya and Tanzania*” project that seeks enhance biodiversity conservation and sustainable utilisation within the Eastern Rift Valley Lakes and Wetlands. This project combines biodiversity conservation, production, and the promotion of various forms of multiple uses;
- The “*Conservation and Sustainable Use of Medicinal Plants*” project that aims to promote *in situ* conservation and sustainable use of medicinal plants;
- “*Ethiopia’s National Bio-diversity Strategy and Action Plan*” which is intended to undertake conservation of and research on biodiversity, and promote the development and utilization of the country’s diversified resources;
- The “*People and Nature Friendly Development in Semein Mountains National Park*” project, which aims to assist in achieving collaborative management and benefit sharing with local people;
- The “*Energy II: Woody Biomass Inventory and Strategic Planning*” project, whose objectives are to assess the available woody biomass resources of the country and to develop strategic planning for each Regional State. This project is funded by the World Bank in support of Ethiopia’s efforts to manage its forest resources in a sustainable manner.

3.3.2 Bilateral support

Countries like Germany, Norway, the Netherlands, Italy etc. provide financial and technical assistance for the implementation of various projects such as:

- The GTZ²⁰ supported “*Advisory Assistance to Forest Administration Project and Household Energy/Natural Resources Conservation*”, which seeks to promote social forestry activities involving households in natural resources conservation and development in the Tigray region;
- The “*Adaba Dodolla Integrated Forest Management*” project, also supported by GTZ, is involved in managing natural forests with the participation of the farming communities in Oromiya region;
- The German Government also supports a project on “*Forest Genetic Resources Conservation*” implemented by GTZ with the objective to protect and conserve forest genetic resources in Ethiopia;
- The Netherlands support a wildlife support programme called “*Forest Conservation in High Priority Forest Areas*” implemented by WWF;
- The Royal Government of Norway supports a wildlife development program at Awash National Park. The goal is to enhance households` livelihood security in pastoral communities and to improve the relations between pastoralists and the park management officers;
- The Italian Government supports the “*Arsi-Bale Rural Development Project*” that aims to identify and analyse current forest degradation issues around Asela-Arsi, and propose appropriate strategies for the establishment of urban and peri-urban forest plantations.

²⁰ Germany.

3.4 National Perspectives

3.4.1 Country vision

The Government of Ethiopia has not yet developed an agricultural sector policy but it has formulated the “Agricultural Development Led Industrialization” (ADLI) that aims at eradicating poverty in the country. Within ADLI’s framework, the government has initiated a Five-Year Agriculture Program that focuses on 3 major areas, namely rapid economic growth, peace and stability, and development based on people’s participation. It also aims to protect and conserve natural resources and at the same time, close the food gap in the medium term. Forest development is planned as integral part of rural development within this programme that anticipates massive participation of farmers in integrating trees with crop cultivation.

The Environmental Protection Authority conducted a study concerning the status of land degradation and desertification over 40 administrative zones of the country. Results from this study that covered eight administrative regions (Tigray, Afar, Amhara, Oromia, Somale, Benishangul, Gambella, and South Ethiopia) have established the status of land degradation for each of these regions. This study served as a basis for setting priorities for identified degraded areas within these regions, and was also used for the preparation of the National Action Plan to Combat Desertification with the financial and technical support of various international organisations.

3.4.2 Strategies and policies

The government has issued a number of policies and strategies to achieve rapid and sustainable economic growth by improving the productivity of the agricultural sector and by building up an agriculturally based industrial sector, which is labour intensive and utilizes local raw materials.

Among the formulated policies are those pertaining to the environment, population, agriculture research, women, science and technology and investment, which are the key to food security and agricultural development. The Environmental Policy of Ethiopia was approved in 1997. Recent changes in the policy and institutional framework for forestry emphasise decentralisation of forest management with the participation of local people in combating deforestation.

The short/long-term agricultural development strategy focuses on environment friendly programmes that would assist small-scale farmers to improve their productivity through dissemination of research-generated technologies. Many technical packages have been and shall be prepared to assist in the realisation of sustainable development. The development is rural-centred with more emphasis in the use of both skilled and unskilled labour so as to achieve food self-sufficiency. The strategy focuses also on the establishment of large-scale commercial agriculture, particularly in the low lands. The new strategy also concentrates on granting support to soil and water conservation efforts in marginal areas.

Food security being the country’s top priority, the government is preparing a national food security strategy, which involves many stakeholders and the local people at large, and

encourages donors to focus on this issue. Each regional state is also expected to prepare its own food security strategy. This strategy also stresses the integration, with emphasis on the use of NWFPs in poverty alleviation, of forestry activities with other land use practices for the achievement of sustainable development

3.4.3 Formally planned commitments

The Government of Ethiopia has committed itself to respond to many global international conventions that it has ratified. Currently, policies are formulated to meet the various commitments, and structures are being reorganized to reflect the needs of the policies and strategies. In addition, the country has developed and put into effect the following policies and strategies that are relevant to sustainable forest management: Environmental Protection of Ethiopia, Ethiopian Forestry Action Program, Conservation Strategy of Ethiopia, Biodiversity Conservation and Development Policy and Strategy.

3.4.4 National capacity

Ethiopia has a limited capacity to generate scientific research and technological innovations that are essential for sustainable development. The government has hence prepared a strategy for capacity building that entails developing human resources as well as building and strengthening of institutions. Training farmers and strengthening public and private sector organisations involved in the development of agriculture are the main challenges.

The Science and Technology Commission is in charge of technological development with the mandate to both build the capacity of the country and provide advice to the government on such issues. The WB assisted Agricultural Research and Training Project is in charge of capacity building at EARO and the Alemaya University of Agriculture.

4. The Causes and Effects of Deforestation and Forest Degradation

4.1 Indirect Causes

Environmental degradation and deforestation have been taking place for centuries in Ethiopia. The underlying forces driving them are complex because there are numerous factors involved, be they man-made or natural.

4.1.1 Land tenure and user rights

Grazing and browsing occur over more than 50 % of the national territory. This land use puts heavy pressures on woodlands and forests. Together with steep and complex topography, it constitutes the biggest threat to the environment. Because pastures are not owned by individuals or by specific groups, rangelands are victim of the “tragedy of the commons” that lies behind their exploitation well above carrying capacity.

4.1.2 Water tenure and user rights

Given the lack of groundwater information, it has not been possible to address the water tenure and user rights issues nor to link water scarcity in some parts of Ethiopia to deforestation and land degradation.

4.1.3 Constraints in agricultural sector

Although agriculture (crop and animal production, forestry and fishery) is a vital sector supporting 85 % of Ethiopia's population, it has, until recently, benefited from very limited investments. Despite the considerable land resources available, agriculture still depends largely on low input/output rain-fed mixed farming, with no integrated disease and pest control, and is based on the utilization of primitive crop varieties and farm technologies. The present government has given top priority to the agricultural sector in order to increase its productivity.

4.1.4 Poverty

Poverty affects more than half of Ethiopia's population and is often the starting point of many activities contributing to deforestation and land degradation. Recognizing poverty alleviation as a national priority the government has developed a national poverty eradication strategy.

Unchecked population growth, & Limited environmental resource base

Ethiopia's high population growth rate leads to bigger demands for crops and grazing lands, construction and energy materials. It puts a heavy pressure on natural resources and, as such, is an important factor of forest and woodland decline.

Economic situation and consumption patterns

Most rural Ethiopians face chronic food insecurity and rely therefore increasingly more on forest products for their daily subsistence. This increased reliance on forests and woodlands resulting from traditional agriculture's poor performance, deficient transport infrastructure, recurrent droughts, and frequent population displacements following conflicts, contributes to deforestation and land degradation.

4.2 Direct Causes

4.2.1 Natural causes

As in many other countries, it is not easy to identify natural causes of deforestation and land degradation. Climatic factors such as high temperatures and prolonged rainfall deficits lead to drought periods and subsequent losses of vegetative cover in fragile environments.

Natural factors like altitude, slope, topography, wind, soil type etc. determine forests' features and are direct causes to deforestation and land degradation. For instance, steep slopes not only favour soil erosion, but also accelerate the spread of forest and woodland fires by directing winds.

There has been no reported loss of vegetative cover due to natural calamities such as floods or earthquakes. However, deforestation is closely linked to the deliberate setting of fire in order to clear land for agriculture.

4.2.1 Causes linked to human activity

For centuries, human activities have induced severe environmental degradation and deforestation, mainly through clearing forests to open up land for agriculture and satisfy 90 % of Ethiopia's population growing domestic energy needs. Private investment in agriculture in the Southwest Ethiopia has also contributed to the current deforestation, as some regional governments are leasing moist evergreen montane forest stands to investors who convert them to coffee and tea plantations.

In addition, because Ethiopia has Africa's largest livestock population, grazing pressure has increased the rate of forest degradation and deforestation. The latter are also closely linked to the deliberate setting of fires to extensive lowland forests and grasslands in the drier parts of the country. Most of these end up as wildfires, since people who started them can no longer control them. Forest burns were particularly severe in the year 2000 as they affected some 150 000 ha of high forest in Bale and Borena zones of Oromiya region, SNNPR and Gambella. Wood products over-harvesting and urbanisation are two other causes of deforestation and land degradation in Ethiopia.

4.3 Effects of Deforestation and of Forest & Range Degradation

About 150 000 - 200 000 ha of natural forests are lost annually in Ethiopia (EFAP, 1994) The most important effects of deforestation and forest degradation are the loss of productive forestlands and the revenues forgone following the loss of NWFPs. Deforestation and land degradation have immediate consequences in Ethiopia where they exacerbate poverty.

4.3.1 Loss of land productivity

Ethiopian farmers have exercised shifting cultivation as their main traditional farming system, whenever there was a decline in their farm fields' fertility. This production system exposes the soil to erosion and wind, causing large losses in some of the NFPAs that are not protected because these forests are not yet gazetted. In many of these areas, local people were not involved during the organisation of these NFPAs and, as a consequence, contribute to increase encroachment that leads to important losses of natural forests and medicinal plants. This worsens erosion problems and subsequent losses of fertile topsoil.

4.3.2 Resource base degradation and decline

Land degradation through soil erosion remains the greatest threat to sustainable land management in the country. Water erosion alone results in an annual loss of 1,9 billion tons of soil in Ethiopia's Highlands. Soil conservation research projects indicate that soil loss on cultivated land can attain 300-400 tons/ha/year. It is estimated that one hectare of 40 % slope eroding land may loose as much as 150 m³ of topsoil/year (MOA, 2000).

The undisturbed natural forest relics found in and around church compounds in central and northern Ethiopia give an indication of the original vegetation composition and cover, confirming the fact forest degradation and decline go along with losses of species diversity and reduction and/or decline of grazing and browsing potential. Moreover, this decline of the resource base exacerbates poverty, forcing people to adopt survival reflexes, and put more pressure on the remaining patches of frail natural forest vegetation, contributing over the long run to desertification.

Desertification is recognized as a major threat to food security, yet it is still expanding and reducing the agricultural production potential of the country. It has been estimated that 27 million ha of agriculturally productive land is eroded, while another 14 million ha the land is seriously eroded, and two million ha are completely eroded and do not support any production (EPA, 2001).

5. Status of Knowledge

5.1 *Lessons learned*

5.1.1 Policy and institutional changes

There have been considerable recent changes in Ethiopia's forest policy and institutional framework. Emphasis has been put towards reducing the government's role in productive activities, in favour of decentralisation of forest management with special attention to local people participation. This has induced an enabling environment to enhance the private sector role in forest development. Concurrently, forestry's integration with other land use practices has been emphasized and sectoral integration in sustainable development adopted as a strategy. There is also an increased recognition of the need to use existing local institutions in the area of forest conservation and development.

The most important issues in sustainable forest use and development relate to ownership, control and access to land and resources. As a response to the above, benefit-sharing with the local people has been adopted as a strategy for forest resources' conservation and development. Government officers have now realised that policy and legislation alone do not reduce all conflicts with the local people.

Recognition of NWFPs in national accounting systems and internalisation of environmental costs (e.g. soil loss, species disappearance) are two key elements of policy reform that together can establish a policy context for sustainable forest management in the uplands.

5.1.2 Resource use and management

There is increasing acknowledgment of the merit of building on existing local knowledge with respect to natural resources and their management, as well as on effective rules and regulations by which forest resources are traditionally managed, to achieve adequate forestry development planning.

The role of forestry has been stressed with emphasis on the use of non-wood forest products in poverty alleviation and food security. Technical packages have been prepared in order to promote the use of non-wood forest products for the rural poor.

Self-financing aiming at sustaining forest resources management is on the agenda. However, the generally low economic return from forestry activities constitutes a major obstacle to enhancing private investment and developing local micro-enterprises and cooperatives to manage, harvest, process forest products (wood and NWFPs) at the source, prior to their marketing.

Rural producers need to be better informed on existing markets and on the best processing technology options. In short, improving rural micro-enterprises with forestry products requires better flow of information from markets and processors to rural managers of the forest resource. Marketing skills and processing research play very important roles. Local organizations that can deal effectively with market mediators, land-use conflicts, and outside economic forces are equally essential. However, rural forest-based micro-enterprises cannot overcome market disincentives which often result from narrowly focused subsidies and unmonitored policies.

5.2 Gaps in Knowledge

5.2.1 Extent of desertification

Though Ethiopia's arid, semi-arid and dry sub-humid areas account for about 70 % of the total landmass and 46 % of the total arable land, information regarding the state of their natural resources and their specific socio-economic situations is limited.

The Ethiopian government has been making quite significant budgetary allocations for environmental protection, particularly for the prevention of land degradation. However, inter-sectoral coordination and integration are lacking. The National Action Plan to combat desertification and its ensuing projects and activities are still not internalised and introduced as part of the Five-Year Plans of the various relevant federal, regional and zone level executive organs.

Despite all efforts made to control the extent of desertification, there is no alternative option made to forest damaging activities. Communities have not been provided with alternative sources of income and subsistence products to enable them to reduce the heavy pressure they exert upon forest resources.

5.2.2 Consequences of desertification

Ethiopia is experiencing soil erosion and fertility loss due to intensive cultivation on steep slopes and the expansion of cultivation onto fragile lands. Despite the seriousness of the situation, the country has limited capacity to monitor ecological degradation and provide reliable information on the processes and dynamics that lead to desertification.

5.2.3 Capturing farmers' experience, technical and managerial skills

State directed approaches for forest conservation and development have often undermined the capacity of the communities to manage and conserve their forest resources. As a result, traditional management methods and rules have been eroded. In Ethiopia, there are many examples concerning the use of indigenous technological knowledge (ITK), much of which has never been properly documented and risks being forgotten, lost or replaced by modern technology. Examples of ITK are detailed hereafter:

- Traditional erosion control practices of Konso-Cherchur Mountains in Western Hararghe, and of parts of Tigray and Wollega;
- Traditional medicine, cropping and conservation practices;
- Traditional conservation practices by the Orthodox Church, a long tradition of preserving natural forests, especially in the most deforested areas of the Northern and Central Highlands;
- Traditional farm forestry as a conservation practice in Central, South and Southwest Borena contributed to the conservation of forest genetic resources;
- Ecologically sound land use system of the Gedeo people (southern region) where forest trees are maintained on farms where coffee, false banana and other food crops are inter-cropped;
- Area closures and exclusion developed in northern Ethiopia that enhanced the regeneration of the natural vegetation etc.

5.2.4 Initiating full participation

Forest development has long been a centralized, top-down approach that paid little attention to local community involvement and failed to achieve sustainable forest management because it did not address forest conservation and management socio-economic issues. Gazetting protected areas without consulting resident communities has also weakened local level responsibility.

Based on the understanding that managing and gazetting forest areas, game reserves and wildlife parks would not be sustainable without community support, the government's attitude is moving towards more acceptance of local people's participation. It needs to develop adaptive participatory approaches to integrated forest protection, management and development.

With regard to environmental protection, a National Steering Committee (NSC) is established to strengthen Environmental Protection Authority (EPA) and NCB and ensure the participation of major stakeholders. The NSC is composed of representatives of EPA, other government executive organs, research and academic institutions, as well as NGOs.

In many areas of the country, local people are starting to realise that no government effort alone can solve the problem of environmental degradation and desertification.

5.2.5 Establishing decentralized statistical planning databases

Data collection and analysis constitutes a major bottleneck for establishing reliable statistical planning databases in Ethiopia. Also, weak electronic communication institutional linkages and networking limit the dissemination of relevant information to many potential users. There is no mechanism that allows pulling together available data and information because of a lack of institutional set-up for databases organization.

The bulk of agricultural and forestry information is currently generated by regional agricultural development bureaus with budgets allocated to regional administration bodies. The Federal Ministry of Agriculture is attempting to establish an agricultural information system that includes information emanating from the forestry sector.

The effort made by the WBISPP to compile information on the country's woody biomass resource is an encouraging start. It should develop the national capacity to monitor physical changes in land use, especially with respect to man-made and natural forests and woodlands. It should also make it possible to conduct forestry planning and management inventories, particularly in regional forest priority areas. Funds have also been allocated for the establishment of a desertification database system through financial support from UNSO/UNDP.

6. Recommendations

6.1 Conclusions

6.1.1 Sustainable management of forests and woodlands

Ethiopia's environmental degradation results from the destruction of forest resources, the subsequent loss of related ecosystems, and the lack of efficient resource use, which constitute the largest threats to forestry development.

It is therefore urgent to intensify efforts to:

1. Protect and improve the management of natural forests and woodlands;
2. Support the establishment of extensive new man-made forests; and
3. Promote TOFs, particularly through their introduction into agricultural landscapes and in urban and peri-urban forestry, in order to secure increased supplies of forest products and services;
4. Emphasise NWFPs' importance, value and back their marketing at household and community levels by acknowledging their significant roles in income generation and food security;
5. Shift the present fuel-wood energy consumption pattern by promoting alternative energy sources and developing more efficient participatory woody biomass resource uses;
6. Develop an integrated Forest Fire Management System (IFFMS) as started with the support of GTZ and FAO.

6.1.2 Income and revenue generation

It is recommended to highlight the importance of wood and non-wood forest products for the economy of rural households and integrate them as outstanding issues in all food security programs.

It is also recommended to improve upon the collection, processing and marketing of forest products through small-scale capital investments in order to increase employment and income opportunities for the populations in rural areas, and to promote:

1. Small forest product enterprises through small credit loans;
2. Trade of bamboo baskets in urban areas and trade of Arabic gum and incense;
3. Non-farm activities such as carving, traditional medicine etc., which can provide employment, income, and subsistence goods to the majority of the people in the country, particularly in times of economic hardship.

Active government, community and individual commitment are necessary in order to strengthen and maintain innovations and improve their impact on sustainable farming systems and forest resources and the conservation of Ethiopia's biological diversity.

Women and women's groups should have direct support for forest products programmes because of their important role as key resource managers in rural areas. The promotion of credit, the development of training packages along with local population participation, market incentives and broad policy reformulation and enforcement are recommended to ensure rural household food security and income diversification.

It is therefore recommended to organize a national workshop on "*Forests and food security in Ethiopia*" to address issues related to the economic importance of NWFPs for rural livelihood diversification and the roles of women in forest based activities.

6.1.3 Research and capacity building

Research

There is an urgent need to develop research activities that will permit (i) a better understanding of local and traditional practices; (ii) developing improved management techniques; (iii) and advantageously integrating trees into farming systems.

The resolution of these prerequisites will greatly enhance the contribution of forests to food security in Ethiopia.

A two-way communication system is needed between policy makers and researchers: the former need to receive clear information on the effects of policies, and, in turn, these policy makers need to clarify for researchers the relative priorities among objectives of economic growth, forest and woodland conservation and poverty alleviation.

Monitoring/evaluation

It is recommended to establish a capability to monitor and evaluate physical changes in land use, especially with respect to the area of forests, woodlands, plantations and trees outside forests. The Woody Biomass Inventory and Strategic Planning Project can be used as an entry

point for the development of harmonised manuals on data collection, aggregation methodologies, and introduction of networking among data producers and users to share experiences.

Training

It is recommended to conduct training in the areas of (i) promotion of alternatives and improved energy sources; (ii) improving wood resources' use (iii) integrated forest management; (iv) integrated forest fire management etc. in order to enhance the skills of professional forest managers as well as the know-how of local populations who will also share their traditional knowledge.

It is also recommended to develop training aimed at creating at all levels, awareness on the use, the value and contribution of man-made and natural forests and trees outside forests to the household, community, local, regional and national economies.

6.2 *Administrative and Legislative aspects*

In terms of institutional and legislative reforms, it is recommended to:

- Review existing policies and legislation and make them more people and environment focused;
- Introduce appropriate land use, and forest policies and develop stable and competent institutions for the conservation, development and sustainable utilization of forests and trees outside forests;
- Delegate through devolution, forest and other tree resources management to the local people;
- Limit the government's involvement in production forestry, promote and enhance the contribution of the private sector in the commercialisation of wood and NWFPs;
- Develop systems that allow the re-utilization of revenues generated from forest conservation and development into the development of new sound and environmentally friendly forest activities;
- Create local fund raising mechanisms to establish forestry assets.

References

- Amare, G.**, 1992. Bamboo and reeds in Ethiopia, Ethiopian Forestry Action Plan. Ministry of Natural Resources and Environmental Protection, Addis Ababa.
- Anonymous**, 1997. Conservation Strategy of Ethiopia: Environmental Protection Authority. Addis Ababa.
- Bekele, M.**, 2000. Forestry Outlook Study for Africa. Draft Report. Ministry of Agriculture. Addis Ababa.
- Bekele, M.**, 2001. Country Report on the Forest Revenue System and Financial Support for Sustainable Forest Management in Ethiopia. Ministry of Agriculture, Addis Ababa.
- Bekele, M.**, 2000. Review and improvement of data related to Wood-Products. Data Collection and Analysis for Sustainable Forest Management in ACP Countries - Linking National and International Efforts - EC-FAO Partnership Programme (1998-2001) - Addis Ababa.
- Bekele, M.**, 2001. Forestry Outlook Study for Ethiopia. Addis Ababa.
- CESEN-ANSALDO/FINMECCANICA Group**, 1986. Main Report 1. Ministry of Mines and Energy, Addis Ababa.
- Chaffey, D.R.**, 1978. South-West Ethiopia Forest Inventory Project, Ministry of Overseas Development, Land Resources Divion. Tolworth Tower, England.
- DECDF**, 1990. *Forest Resource Identification and Desk Study*. Département pour la conservation et le développement des forêts de l'Etat. Ministry of Agriculture, Addis Ababa.
- Deffar, G.**, 1998. Non-Wood Forest Products in Ethiopia. Addis Ababa.
- Deffar, G.**, 2000. Non- Wood Forest Products in Ethiopia. Data Collection and Analysis for Sustainable Forest Management in ACP Countries - Linking National and International Efforts. EC-FAO Partnership Programme (1998-2000), Addis Ababa. December 1998.
- EARO**, 1999. Forestry Research Strategic Plan. Ethiopian Agricultural Research Organization. Addis Ababa.
- Ethiopian Forestry Action Program**, 1992. Challenges: Final Report. Ministry of Natural Resources Development and Environmental Protection. Addis Ababa.
- FAO**, 1984. Land use, Production regions and farming systems: Assistance to land use planning. Technical report No. 3, Rome.

- FAO**, 2001. Non-Wood Forest Products in Africa: A Regional and National Overview. Non-Wood Forest Products Program Working Paper - FOPW/01/1, Rome.
- FAO**, 1997. Forest Products Yearbook, FAO.
- Forestry Conservation, Development and Utilization Proclamation. Proclamation No. 94/1994**, 1994. Negarit Gazette of the Transitional Government of Ethiopia, Addis Ababa.
- FRC**, 1986. Growth of some forest trees in Ethiopia and suggestions for species selection in different climatic zones. Forestry Research Note N02, FRC, Addis Ababa.
- JICA**, 1998. Forest Resources Management Study in The South Western Part of Ethiopia. Main Report. Volume. I. Ministry of Agriculture. Addis Ababa.
- Margiotta, M. et al.**, 2002. Urban and Péri-urban Forestry in the Highlands of Arsi: the case of Asela. Draft Paper to be presented at the FAO Sub-Regional Workshop “Feeding Cities in the Horn of Africa”, Addis Ababa, 7 – 9 May 2002.
- MEDAC**, 1999. Federal and Regional Governments Recurrent Budget by Sectors. Published by the Ministry of Finance, Addis Ababa, Ethiopia, October 1998.
- MOA**, 1998. Forestry data on Ethiopia. Ministry of Agriculture, Natural Resources Management and Regulatory Department, Addis Ababa: Proceedings of Sub-Regional Workshop on Forestry Statistics IGAD region, Nakuru, Kenya, 12 – 16 October 1998.
- MOA**, 2000. The Contribution of Non-Wood Forest Products. A field Assessment Report: Ministry of Agriculture. Addis Ababa.
- Ruesing, M.**, 1998. Forest Monitoring in the High Forests of Ethiopia using Remote Sensing. Ministry of Agriculture, Addis Ababa.
- SFCDD**, 1990. Forest Resource Identification and Desk Study. State Forest Conservation and Development Department - MoA. Addis Ababa.
- WBISPP**, 1995. The Woody Biomass Inventory and Development Project: Phase II. Project Document. Government of the Federal Democratic Republic of Ethiopia - Addis Ababa.
- WBISPP**, 2000. Strategic Plan for the Sustainable Development of Woody biomass resources. Woody Biomass Inventory and Strategic Planning Project. Moa, Ethiopia.

Annexes

ANNEX 1: TERMS OF REFERENCE OF THE MISSION

TORs International Consultant

Background: It is proposed that country case studies will be prepared in the African region in Mali (CILSS), Namibia (SADC) and Ethiopia (IGAD) in advance of the Regional Workshop for Africa to be held in Nairobi, Kenya in May 2002. These case studies will outline the causes and effects of deforestation and forest degradation; lessons learned and priority needs strategies and methodologies to enhance the role of planted forests, trees outside forests in integrated landscape management and economic significance of NWFPs. The country study reports will be published in English and French in advance of the International Workshop together with guidelines for each participating country to prepare their inputs. The consultant will also assist in providing technical advice in preparation and conducting the workshops and co-ordinating and reporting outputs.

Tasks to be Undertaken: With respect to enhancing the role of planted forests and trees outside forests for production of wood and non-wood forest products (including fuel-wood, wood products, food, livestock fodder, medicines, protection of soil and water values, shelter, shade etc) in individual country case studies the international consultant, assisted by a national consultant, under the supervision of task managers will consult stakeholders widely to evaluate and detail for each country case study:

Background highlights with direct or indirect impacts upon the forestry sector, including population pressure, food security, land access, land-use rights, availability of credits, market access, forest resources (natural and planted), deforestation, forest degradation, desertification, afforestation and other key indicators of the significance and state of the forestry sector.

Policy, legal, planning and institutional frameworks outlining the vision and commitment of the Government, detailing strengths and weaknesses in capacity and capability (technical, technology and financial) and awareness of the environmental, economic, social and cultural value of these forest resources and ecosystems for the livelihoods rural populations;

Related to 1 above, inter-sectoral linkages, conflicts in land-use policy and practice, incentives and subsidies, which impact upon the forestry sector.

Appropriateness of current policies as reflected in alternative mechanisms and practices, programmes and projects for achievement of sustainable forest management.

Information, data and reports on the extent (quantity and quality) of planted forest resources (forest plantations - rain-irrigated and/or with treated waste water and trees outside forests) and production of the main wood and non-wood forest products and their respective roles in provision of goods and services;

Meet with all stakeholders (line ministries e.g. Agriculture, Municipal Affairs; communities, rural families, NGOs, private sector, research and academic institutions and international

agencies etc) to discuss and report the perceived appropriateness of current policies and priorities in planning and soundness of alternative mechanisms, practices, programmes and projects in achieving sustainable forest management and equitable sharing of opportunities, risks, costs and benefits; and

Formulate a list of the key issues, constraints, opportunities, lessons learned, success stories and recommended development proposals within the capacity and capability of each country to be presented as case studies at the regional workshops to represent different ecological zones, institutional and stakeholder circumstances.

The case study reports are to be prepared and presented to FAO in English within 1 month of completion of the fieldwork to allow time for translation into French and dissemination to country participants to the regional workshops. A guide will be prepared for the format and content of the case study report for each country.

The consultant will support the FAO task managers with technical advice and recommendations on the format, content, activities and outputs from the regional workshops, with potential (to be confirmed) to attend as facilitators for the working groups. The workshop will be conducted in English and the proceedings prepared in English and French.

Duration: 3 person months between February - April 2002

Locations: Case studies in Mali, Namibia and Ethiopia, brief and debrief for case studies in Rome prior to and after completion of field missions

Task Managers: Pape Kone, Africa Regional Office, FAO supported by Jim Carle and Syaka Sadio, Forest Resources Division, FAO, HQ, Rome Italy and FAO representations in each country.

TORs National Consultant

Background: It is proposed that country case studies will be prepared by an international consultant with support from an in-country national consultant in each of Mali, Ethiopia, Namibia in readiness for a Regional Workshop for the low forest cover countries in Africa to be held in Nairobi in June/July, 2002. These case studies will outline the causes and effects of deforestation and forest degradation; lessons learned and priority needs strategies and methodologies to enhance the role of planted forests, trees outside forests in integrated landscape management and economic significance of NWFPs. The country study reports will be published in English/French in advance of the International Workshop together with guidelines for each participating country to prepare their inputs.

Tasks to be Undertaken: With respect to enhancing the role of planted forests and trees outside forests for production of wood and non-wood forest products (including fuel-wood, wood products, food, livestock fodder, medicines, protection of soil and water values, shelter, shade etc) in individual country case studies the national consultant will provide support to the international consultant and facilitate effective and balanced in-country participation with stakeholders; ensure appropriate approvals, background resources and logistical support are available for meetings and field visitations; and to achieve a dispassionate and professional case study document. Specific tasks include:

Provide the link between the key stakeholders and the international consultant to identify key resource persons, organize meetings and stakeholder forums, contribute fully to discussions, arrange field visitations and provide logistical support as necessary;

Ensure that documentation and resources as detailed in the terms of reference for the international consultant (attached) are available in a timely manner and assist in interpretation;

Assist the international consultant to prepare and review the draft case study report to reflect the current status and key issues, constraints, opportunities, lessons learned, success stories and recommended development proposal priorities of the country.

Other tasks as identified during the case study

Duration: Full time, 1 person month, between February and April 2002 (during fielding of international consultant)

Locations: One national consultant in each of Mali, Ethiopia, Namibia - field visits included

Task Managers: Pape Kone, Africa Regional Office, FAO supported by Jim Carle and Syaka Sadio, Forest Resources Division, FAO, HQ, Rome Italy; and in-country supervision and administrative support by FAO representations in each country.

ANNEX 2: ITINERARY, PLACES VISITED BY THE MISSION

Itinerary for the Mission in Ethiopia, April 2002

Date	Area Visited	Persons Contacted	Responsibility
2/4/02	Munessa Shashemene Forest Industries Enterprises	Mr B. Wolde Mr D. Diriba Mr S. Hussein	Manager Department of Silviculture Head, Processing Division
3/4/02	Wondo Genet College of Forestry	Dr Abdu Dr T. Bekele	
4/4/02	Adaba-Dodolla Integrated Forest Development. Project	Mr A. Kubsa Mr G. Amenti	Advisor of Project Zone Department Head
8/4/02	Western Hararghe Zone Jello Muktar RFPAs	Mr M. Shieka Mr T. Cheru Mrs Y. Dibissa Mr G. Gonfa	Department Head, Forestry Team Leader Team Leader Planning Head
11/04/02	Woody Bio-mass Inventory and Strategic Planning Project	Mr G. Medhin Hadera	Manager, WBISPP
12/04/02	IBCR	Mr T. Bekele	Department Head,
15/04/02	EARO	Dr Y. Emishaw	Head, Forestry Research Center

ANNEX 3: PERSONS MET BY THE MISSION

ADDIS ABABA

- Mburathi, G.K.** FAO Representative in Ethiopia, to OAU and ECA.
- Kinfu, M.** National Programme Officer. FAO Representation in Ethiopia: P.O. Box 5536 Addis Ababa, ETHIOPIA. Mesfin.kinfu@field.fao.org
- Ayele, M.** Programme Clerk / Secretary. FAO Representation in Ethiopia: P.O. Box 5536 Addis Ababa, ETHIOPIA.
- Bekele, M.** Team Leader Forest & Wildlife Technology Regulatory, Natural Resources Management & Regulatory Department. Ministry of Agriculture, P. O. Box 60054, Addis Ababa, ETHIOPIA. millib@freemail.et.
- Haderea, G.** Project Coordinator - Woody Biomass Inventory and Strategic Planning Project. Addis Ababa, P.O. Box 62158, Ethiopia. wbispp@telecom.net.et .
- Sutcliffe, P.** Project Team Leader / Land Use Planner. Tecstart International Limited. Associate Expert Woody Biomass Inventory and Strategic Planning Project. Addis Ababa, P.O. Box 62158, Ethiopia. pitec@tecstart.com
- Amente, G.** GTZ-IFMP Project Coordinator, P.O. Box 5, Dodola, Ethiopia. gtz.ifmp@telecom.net.et
- Kubsa, A.** Community Forestry Backstopping specialist. GTZ-IFMP, Dodola, P.O. Box 185, Bishoftu. gtz.ifmp@telecom.net.et .
- Yemshaw, Y.** Center Manager, Forestry Research Center - Addis Ababa

PUBLICATIONS AVAILABLE ON FOREST PLANTATIONS

Forest Plantation Working Papers: Thematic Paper Series

- Working Paper FP/1 *Mean Annual Volume Increment of Selected Industrial Species.*
Ugalde L. and Perez O. April 2001.
<http://www.fao.org/DOCREP/004/AC121E/AC121E00.HTM>
- Working Paper FP/2 *Biological Sustainability of Productivity in Successive Rotations.*
Evans J. March 2001.
<http://www.fao.org/DOCREP/004/AC122E/AC122E00.HTM>
- Working Paper FP/3 *Plantation Productivity.* Libby W.J. March 2001.
<http://www.fao.org/DOCREP/005/AC601E/AC601E00.HTM>.
- Working Paper FP/4 *Promotion of Valuable Hardwood Plantations in the Tropics.*
A Global Overview. Odum F.K. March 2001.
<http://www.fao.org/DOCREP/004/AC124E/AC124E00.HTM>
- Working Paper FP/5 *Plantations and Wood Energy.* Mead D.J. March 2001.
<http://www.fao.org/DOCREP/004/AC125E/AC125E00.HTM>
- Working Paper FP/6 *Non-Forest Tree Plantations.* Killmann W. March 2001.
<http://www.fao.org/DOCREP/004/AC126E/AC126E00.HTM>
- Working Paper FP/7 *Role of Plantations as Substitutes for Natural Forests in Wood*
Supply – Lessons learned from the Asia-Pacific Region.
Waggener T. March 2001.
<http://www.fao.org/DOCREP/004/AC127E/AC127E00.HTM>
- Working Paper FP/8 *Financial and Other Incentives for Plantation Establishment.*
Williams J. March 2001.
<http://www.fao.org/DOCREP/004/AC128E/AC128E00.HTM>
- Working Paper FP/9 *The Impact of Forest Policies and Legislation on Forest*
Plantations. Perley C.J.K. March 2001.
<http://www.fao.org/DOCREP/004/AC129/AC129E00.htm>
- Working Paper FP/10 *Protecting Plantations from Pests and Diseases.* Ciesla W.M.
March 2001.
<http://www.fao.org/DOCREP/004/AC131E/AC131E00.HTM>
- Working Paper FP/11 *Forestry Out-Grower Schemes: A Global View.* Race D. and
Desmond H. March 2001.
<http://www.fao.org/DOCREP/004/AC131E/AC131E00.HTM>
- Working Paper FP/12 *Plantations and Greenhouse Gas Mitigation: A Short Review.*
Moura-Costa P. and Auckland L. March 2001.
<http://www.fao.org/DOCREP/004/AC132E/AC132E00.HTM>
- Working Paper FP/13 *Future Production from Forest Plantations.* Brown C. March
2001.
<http://www.fao.org/DOCREP/004/AC133E/AC133E00.HTM>

- Working Paper FP/14 *Forest Plantation Resources, FAO Data Sets 1980, 1990, 1995 and 2000.* Del Lungo, A. December 2001.
<http://www.fao.org/DOCREP/004/AC134E/AC134E00.HTM>
- Working Paper FP/15 *Global Forest Plantation Development: Review for FRA 2000.* Vuorinen A.P. and Carle, J.B. April 2002.
- Working Paper FP/16S *Bibliografía Anotada Sobre los Efectos Ambientales, Sociales y Económicos de los Eucaliptos.* Compilación de documentos elaborados en inglés, francés y español entre 1985 y 1994. Marzo de 2002.
<http://www.fao.org/DOCREP/005/Y4016S/Y4016S00.HTM>
- Working Paper FP/16E *Annotated Bibliography on Environmental, Social and Economic Impacts of Eucalyptus.* Compilation from English, French and Spanish Literature, 1985 to 1994. Revised (Combined) Edition, March 2002.
- Working Paper FP/17S *Bibliografía Anotada Sobre los Efectos Ambientales, Sociales y Económicos de los Eucaliptos.* Compilación de documentos elaborados en inglés, francés y español entre 1995 y 1999. Palmberg C. Marzo de 2002.
<http://www.fao.org/DOCREP/005/Y7605S/Y7605S00.HTM>
- Working Paper FP/17E *Annotated Bibliography on Environmental, Social and Economic Impacts of Eucalyptus.* Compilation from English, French and Spanish Literature, 1995 to 1999. Palmberg C. March 2002.
- Working Paper FP/18 *Tropical forest plantation areas 1995 data set.* Pandey D. May 2002.
<http://www.fao.org/DOCREP/005/Y7204E/Y7204E00.HTM>
- Working Paper FP/19 *Teak (Tectona grandis) in Central America.* De Camino, R.V., Alfaro, M.M. and Sage, L.F.M. May 2002.
<http://www.fao.org/DOCREP/005/Y7205E/Y7205E00.HTM>
- Working Paper FP/20 *Melina (Gmelina arborea) in Central America.* Alfaro, M.M. and De Camino, R.V. May 2002.
<http://www.fao.org/DOCREP/005/Y7206E/Y7206E00.HTM>
- Working Paper FP/21 *Case study of hardwood programmes in Fiji, Solomon Islands and Papua New Guinea.* Hammond, D. May 2002.
<http://www.fao.org/DOCREP/005/Y7207E/Y7207E00.HTM>
- Working Paper FP/22 *Case study of long rotation eucalypt plantations in New South Wales.* Heathcote, R. June 2002.
<http://www.fao.org/DOCREP/005/Y7208E/Y7208E00.HTM>
- Working Paper FP/23 *Case study of the tropical forest plantations of Malaysia.* Krishnapillay, D.B. June 2002.
<http://www.fao.org/DOCREP/005/Y7209E/Y7209E00.HTM>

- Working Paper FP/24 *Hardwood plantations in Ghana.* Odoom, F. June 2002.
<http://www.fao.org/DOCREP/005/Y7210E/Y7210E00.HTM>
- Working Paper FP/25 *Planted Forests Database (PFDB): Structure and Contents.*
Varmola, M. and Del Lungo, A. July 2003.
- Working Paper FP/26 *Planted Forests Database: Analysis of Annual Planting Trends and Silvicultural Parameters for Commonly Planted Species.*
Del Lungo, A. September 2003.
- Working Paper FP/27E *Role of Planted Forests and Trees Outside Forests in Sustainable Forest Management: Republic of Tunisia - Country Case Study.*
Rouchiche, S. and Abid, H. October 2003.
- Working Paper FP/27F *Rôle des plantations forestières et des arbres hors forêts dans l'aménagement forestier durable: République de Tunisie – Rapport par pays.* Rouchiche, S. et Abid, H. Décembre 2003.
- Working Paper FP/28E *Role of Planted Forests and Trees Outside Forests in Sustainable Forest Management: Republic of Mali - Country Case Study.*
Thomas, I. and Samassekou, S. October 2003.
- Working Paper FP/28F *Rôle des plantations forestières et des arbres hors forêts dans l'aménagement forestier durable: République de Mali - Rapport par pays.* Thomas, I. et Samassekou, S. Décembre 2003.
- Working Paper FP/29E *Role of Planted Forests and Trees Outside Forests in Sustainable Forest Management: Republic of Ethiopia - Country Case Study.*
Thomas, I. and Bekele, M. October 2003.
- Working Paper FP/29F *Rôle des plantations forestières et des arbres hors forêts dans l'aménagement forestier durable: République d'Ethiopie - Rapport par pays.* Thomas, I. et Bekele, M. Décembre 2003.
- Working Paper FP/30E *Role of Planted Forests and Trees Outside Forests in Sustainable Forest Management: Republic of Namibia - Country Case Study.*
Thomas, I. and Chakanga, M. October 2003.
- Working Paper FP/30F *Rôle des plantations forestières et des arbres hors forêts dans l'aménagement forestier durable: République de Namibie - Rapport par pays.* Thomas, I. et Chakanga, M. Décembre 2003.
- Working Paper FP/31E *Role of Planted Forests and Trees Outside Forests in Sustainable Forest Management: Sultanate of Oman - Country Case Study.*
Rouchiche, S. October 2003.
- Working Paper FP/31F *Rôle des plantations forestières et des arbres hors forêts dans l'aménagement forestier durable: Sultanat d' Oman - Rapport par pays.* Rouchiche, S. Décembre 2003.
- Working Paper FP/32E *Role of Planted Forests and Trees Outside Forests in Sustainable Forest Management: Islamic Republic of Iran - Country Case Study.* Rouchiche, S. and Haji Mirsadeghi, M. A. October 2003.

Working Paper FP/32F

Rôle des plantations forestières et des arbres hors forêts dans l'aménagement forestier durable: République Islamique d'Iran - Rapport par pays. Rouchiche, S. et Haji Mirsadeghi, M. A. Décembre 2003.

International Poplar Commission - FAO Statutory Body (English, French, Spanish)

(<http://www.fao.org/forestry/FO/STATBOD/Technical/IpC/ipc-e.stm>)

Report on the 21st Session of the International Poplar Commission and the 40th Session of the Executive Committee, Portland, Oregon, USA, 24-28 September, 2000.

Report on the 41st Session of the Executive Committee of the International Poplar Commission, Rome, Italy, 2 September, 2002

Information Notes (English, French, Spanish)

Forest Plantations (<http://www.fao.org/forestry/FODA/Infonote/en/t-plantations-e-2000.stm>)

International Poplar Commission (<http://www.fao.org/forestry/FODA/Infonote/en/t-ipc-e.stm>)

See also: FRA Working Paper No.18