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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 NAMIBIA
COUNTRY CASE STUDY***

I. Thomas and M. Chakanga

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**Forest Resources Development Service
Forest Resources Division
Forestry Department**

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For further information please contact:

Mr. Jim Carle, Senior Forestry Officer (Plantations and Protection)
Forest Resources Development Service
Forest Resources Division
Forestry Department
FAO
Viale delle Terme di Caracalla
I-00100 Rome (Italy)
e-mail: Jim.Carle@fao.org or Syaka.Sadio@fao.org

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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

AMCOM	Amalgamated Commercial Holdings
C&I	Criteria and Indicators
CBD	Convention on Biological Diversity
CBT	Community Based Training
CBTE	Community based Tourism Enterprises
CCD	Convention to Combat Desertification
CITES	Convention on International Trade in Endangered Species
CSO	Central Statistics Office
DAPP	Directorate of Agricultural Policy Planning
DBC	Development Brigade Corporation
DEA	Directorate of Environmental Affairs
DED	German Development Service
DoF	Directorate of Forestry
DRM	Directorate of Range Management
DTR	Directorate of Tourism and Resorts
DWA	Department of Women Affairs
DRFN	Desert Research Foundation of Namibia
EAI	Environmental Impact Assessment
FAO	Food and Agricultural Organization of the United Nations
FINNIDA	Finnish International Development Agency (Department for International Development Cooperation)
FSP	Forestry Strategic Plan
FSTCU	Forestry Sector Technical Coordination Unit
FVM	Forest Vegetation Mapping,
GIS	Geographic Information Systems
CRIAA	Centre for Research Information Africa Action
GR	Government of the Republic of Namibia
GDP	Gross Domestic Product
GDS	Germany Development Services
GTZ	Germany Development Agency
IMS	Information and Management Systems
IFF	Intergovernmental Forum on Forests
IPF	Intergovernmental Panel on Forests
KFW	German Development Bank
MAWRD	Ministry of Agriculture Water and Rural Development
MET	Ministry of Environment and Tourism
MHEVTST	Ministry of Higher Education, Vocational Training, Science and Technology
MLRGH	Ministry of Local, Regional Government and Housing
MLRR	Ministry of Lands Resettlement and Rehabilitation
NABA	Namibia Biotechnology Alliance
NBRI	National Botanical Research Institute
NACOBTA	Namibia Community Based Tourism Association
NANGOF	Namibia Non-Governmental Organisation Forum
NAP	National Agricultural Policy
NAPCOD	National Programme to Combat Desertification
NAU	Namibia Agricultural Union
NDT	Namibian Development Trust
NDP	National Development Plan
NEPRU	Namibian Economic Policy Research Unit
NFI	National Forest Inventory
NNFU	Namibian National Farmers' Union

NFFP	Namibia Finland Forestry Programme
NGO	Non-Governmental Organisation
NNBTF	Namibia National Biodiversity Task Force
N\$	Namibian Dollar (exchange rate as of 10 th of May, 2002 US\$1,00)= N\$10,00)
NNF	Namibia Nature Foundation
NRSC	National Remote Sensing Centre
NWFPs	Non-Wood Forest Products
PRA	Participatory Rapid Appraisal
RETOSA	Regional Tourism Organisation for Southern Africa
RSA	Republic of South Africa
SA	Part of NGO name (CRIAA SA-DC) Centre for Research Information Africa Action – Southern Africa Development and Consulting
SADC	Southern Africa Development Community
SADC-ELMS	Southern Africa Development Community Environment Land and Management Sector
SIDA	Swedish International Development Agency
SME	Small and Medium Enterprises
UNAM	University of Namibia
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNCED	United Nations Conference on Environment and Development
UNICODE	United Nations International Convention on Desertification
USAID	United States Agency for International Development
4 -O regions	Four regions in the north central Namibia their names starts with a letter 'O' and form a bigger region which used to be known as OWAMBO (Ovamboland).

Executive Summary

Preamble

The Netherlands approved the support of targeted outputs and activities as a follow up of the “Teheran Process”. As a result, country studies are being prepared that outline the causes and effects of deforestation and forest degradation as well as the priority need to enhance the role of planted trees.

Since its recent independence in 1990, Namibia can look back on a decade of new interventions and testing of various approaches to community-based natural resource management, rural development, SME promotion, conservation and sustainable use of biodiversity. Ultimately this all adds up to the struggle against deforestation and desertification.

Water, rainfall scarcity and variability dictate the patterns of human settlement and migration. About 60% of Namibia’s young population of 1,8 million is concentrated in the more humid northern territory. Although one of the world’s driest countries, Namibia is a nation of impressive, often unique, but to some extent, endangered habitats and rich plant and animal diversity. Its subsistence agriculture contributes only 1,5 % of GDP but is essential to the livelihood of 70 % of the population.

The Government of Namibia has globally acknowledged the urgent need to conserve the country’s ecosystems and species and the NDP¹ II 2000-2005 proposed actions for the development of the forestry sector. The Directorate of Forestry (DoF) responsible for forest development policy, planning and decision-making has introduced major policy changes to rectify the centralist model of natural resources administration. The revised forest policy stresses poverty alleviation and aims to empower local populations to manage forest resources and create favourable conditions for private investment.

The legal framework is encapsulated in the Forest Act, 2001 which deals with management issues, the need to plant trees, and to conserve and enhance the natural environment. The strategic plan has four programme areas namely: (i) institutional capacity building, (ii) community level management of natural forests, (iii) farm forestry and (iv), environmental forestry.

Namibia, which joined the United Nations as an independent state only in 1990, is already a signatory to major UN environmental conventions. External assistance to the forestry sector is mainly provided by Finland, Germany and Denmark while international organizations (FAO, SIDA, WB etc.) provide financial and technical support to Namibia’s National Programme to Combat Desertification.

Data and information on natural forests and other woody biomass types are very limited. Namibia’s 12,4 million ha wooded area (1995 estimate) produces a considerable amount of woody biomass from its three main vegetation types: deserts, savannas and woodlands that occupy 16 %, 20 % and 64 % of the land, respectively. The mean annual loss of forest cover

¹ National Development Plan

was estimated between 1990-1995 at 42 000 ha, equivalent to a yearly deforestation rate of 0,3% (FAO, 1997)

Planted forests did not constitute a priority development item during colonial rule. There are only 300 ha for the whole country. However the recent Development of Forestry Policy and the Forests Act, 2001 advocate tree planting and target 10 000 ha of woodlot plantations through agroforestry systems, to meet rural peoples' needs and to support their livelihoods.

Trees outside forests mainly occur on farming fields and human settlements as homestead plantings, farm woodlots, live fencing and urban forests. Their importance is highlighted in the Nature Conservation Ordinance Amendment Act, 1997, the Forests Act, 2001 as well as in the customary laws, which forbid destruction of fruit trees and impose penalties in traditional courts if breached.

In 1996, the DoF estimated the total economic value of forest resources as N \$1 058 billion. Despite a permit system, about 50 % of the wood biomass is harvested illegally. Traditional wood, charcoal and dung account for only 18 percent of the energy consumption, even though they are the main energy source for 60 percent of the population. Subsistence consumption of fuel-wood is estimated at 520 000 tons/year and commercial consumption at 153 000 tons/year. Because consumption of industrial wood keeps increasing, the government seeks ways to reduce its high import bill. NWFPs traded in informal and formal markets include fruits and their by-products, some of which gained access in the international market arena. Eco-tourism is a rapidly expanding market with over 500 000 tourists in 1998, and an annual growth rate estimated at 20%.

The DoF's initiatives towards sustainable forest management include: (i) the adoption of criteria and indicators for sustainable forest management; (ii) the formulation of the first Forestry Strategic Plan for Namibia, 1996; (iii) the recognition of the importance of participatory planning approaches; (iv) the adoption of a permit system to regulate harvesting of wood products; (v) the certification of a number of NWFPs for export to Europe and USA; (vi) the promotion of human resources' development with the objective of filling 70 % of all professional posts by the year 2005; (vii) encouraging private companies to invest in forest development etc.

Conclusions

Forestry focus:

- Namibian forestry is mainly focused on conserving existing forest resources and other woody vegetation through sustainable management practices;
- NWFPs play a major role in the lives of the majority of rural Namibians;
- Better land use planning at the regional and local levels should make the forest estate more immune to unplanned conversions of the estate to non-forest uses, as is the case today;
- Namibia attempts to pursue policies that attract private investment.

Major assets and potentials:

- Its real potential for developing planted forests using a number of exotic tree species;
- Its unique forest resources and their significant potential environmental and economic value;

- The many opportunities that exist to develop creative investments in processing and taking advantage of new niche-market specialized products;
- The forest sector's new policies, which endorse biological diversity conservation and mitigation of climate change and call for regular assessment of the resource;
- The steadily improved appreciation of land degradation and desertification control.

Issues:

- At present the dry environment limits the development of large-scale forest plantations;
- Namibia has quite supportive policies and legislation in forestry and wildlife, but would gain from more efficient, partly decentralized administrations;
- The sector's limited capacities and capabilities constitute a major constraint in view of the diversity of issues to be resolved and to the dimension and distribution of the forest estate.

Recommendations

Development choices and issues:

- Evaluate the actual contribution of the forestry sector to the national economy;
- Make the best of what forests have to offer to complement agriculture in ensuring improved food security for the country;
- Multiply and diversify rural incomes;
- Encourage farmers to participate in charcoal production.

Institutional improvement:

- Pursue capacity building, particularly in forest management, and in the development of additional human resources especially in forestry extension;
- Initiate experimentation and forest management, and conduct research into efficient charcoal-making methods;
- Adopt and develop new technologies to creatively process wood and non-wood products.

Resource use and management:

- Promote NWFPs, document more comprehensively their traditional knowledge and pursue research to sustain their use;
- Promote forest management planning, develop management plans and enhance people's benefits from forest management and conservation.

Enhancing the role of planted forests and TOFs:

- Document TOFs and reflect local priorities and indigenous knowledge on trees outside forests;
- Establish plantations to meet peoples' needs, conduct experimentation, initiate exchange of information on tree planting techniques and activities;
- Develop cooperation between the MET and municipalities to promote urban tree planting.

Introduction

In the Republic of Namibia, forests and trees have played an important role in the development of human activities by supplying populations of both African and European origin with a variety of products. Forests and trees provide economic goods such as fuel-wood, construction materials and food commodities, as well as fodder for livestock. In addition to their environmental functions, these renewable natural resources hold also important social, cultural and psychological contributions to the livelihood of the Namibian people.

However, the areas that were once covered by forests and woodlands have diminished rapidly over the last few decades due to a combination of many factors. These include excessive wood harvesting to satisfy the domestic energy needs of a fast growing population, fires, overgrazing, harsh climatic conditions, and up to recently, an inadequate forest policy. This has led to shortages of fuel-wood and building material, and triggered severe soil erosion processes in several parts of the country, especially the heavily populated northern regions.

In Namibia the terms desert, savannah and woodlands refer to the three major vegetation types encountered in the country, where most of the woodlands and a few areas defined as savannahs fall within the FAO (1998) definition of forest.

Initiated as a result of the Netherlands' support to achieving the targeted outputs and activities of the "Teheran Process", this mission implemented by FAO and approved by the Namibian 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. Namibia, as member of the Southern Africa Development Community (SADC), is one of the three LFC 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 CILSS sub-region and Ethiopia in the IGAD sub-region. The mission's terms of reference are detailed in annex 1.

This case study report is one such output that outlines 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 the economic significance of wood and NWFPs. The report also outlines recommendations for development proposals.

1. General Overview

1.1 *Background setting*

1.1.1 **Brief geographical and historical country description**

Located in southwest Africa, between 17⁰ S and 29⁰ S, 11,7⁰ E and 25,4⁰ E, the Republic of Namibia covers a total land area of 830 000 km². Almost three and a half times larger than the United Kingdom, the country covers nearly 3 % of the total land area of Africa but counts

only 0,2 % of the whole African population. Namibia shares boundaries with Angola and Zambia in the North, Zimbabwe at the eastern end of the Caprivi strip, Botswana in the East, South Africa in the south and south-east, and the Atlantic Ocean in the west along 1600 km of shoreline (Erkkilä, 2001).

Namibia's the four main regions are: (i) the Namib Desert, which gives the country its name; it is a dry region that stretches between the entire coastline and the Escarpments, (ii) The Namib Escarpment, a set of mountain ranges separating the desert zone from the Central Plateau, (iii) the Central Highland or Plateau which covers most of the country from the Kuene River (along the northwest border with Angola) to the Orange River (in the southeast), and (iv) the Mega Kalahari in the north and northeast. (Erkkilä and Siiskonen, 1992)

Namibia is the driest country in the Southern Africa region. Rainfall varies from below 50 mm in the southwest (coastal desert) to 700 mm in the north and northeast semi-humid regions of the country. Nonetheless, Namibia produces a considerable amount of woody biomass from its three main vegetation types, namely: deserts, savannahs and woodlands, which occupy 16 %, 20 % and 64 % of the land, respectively. Most of the woody biomass is found in savannahs and woodlands.

1.1.2 Governance and administration

The Government of the Republic of Namibia was officially recognised as a new, independent nation on March 21st, 1990.

The Namibian Constitution was unanimously adopted by the 72-member Constituent Assembly on 9/02/ 1990. It lays down the division of powers between the legislature, the executive and the independent judiciary. The 72 members of the National Assembly are elected for a 5-year term and members (two from each geographical region) of the National Council form the Namibian bicameral legislature.

The executive branch of government is headed by the President, elected by direct popular vote for a term of 5 years. The Cabinet headed by the Prime Minister assists the President. The country is divided into 13 administrative regions, namely: Caprivi, Erongo, Hardap, Karas, Khomas, Kunene, Ohangwena, Okavango, Omaheke, Omusati, Oshana, Oshikoto, and Otjozondjupa.

1.1.3 Policy and legal framework

The judicial power, "subject only to the Constitution and the law", is shared by a Supreme Court, a High Court and a number of Magistrate and Lower Courts (Erkkilä and Siiskonen, 1992).

In examining Namibia's legal approaches to conserving and managing natural resources (specially forests ones), one must consider its relatively recent independence and colonial legacy, its fragile ecosystems, and the diversity of its people.

The Government of Namibia has globally acknowledged the urgent need to conserve ecosystems and species within the national territory. It has taken up the challenge by:

- Acknowledging as explicitly mentioned in the Namibian Constitution (Article 95:I) that, “in the interest of the welfare of the people, the State shall adopt policies aimed at maintaining ecosystems, ecological processes and biodiversity for the benefit of present and future generations”;
- Adopting in 1996, the Forestry Strategic Plan as a complement to the Forest Policy approved in 1992, to form the major instruments of the forestry sector.

1.1.4 National development plans

The National Planning Commission (NPC) is responsible for the preparation of the country’s National Development Plans. It has, since independence in 1990, developed the following: Transitional Development Plan (1990/91-1993/94), First National Development Plan (NDP I: 1995/96-1999/2000), and Second National Development Plan (NDP II: 2001/2002-2005/2006).

1.2 Environmental characteristics

1.2.1 Geology, land forms and soil

Although recent deposits of sands and calcretes cover much of Namibia, the geology of the country is complex. It consists of numerous landforms or geophysical zones that can, be summarised into the following four major categories (Bernard *et al.*, 1998).

The Namib Desert

It constitutes an 80 to 120 km-wide geo-ecological zone parallel to the Atlantic Ocean shore. It is bounded on the east by the Namib Escarpment. It covers about 16 % of the country’s land area and receives less than 100- mm annual rainfall.

The Namib Escarpment

It is a narrow transition zone between the desert and the Central Highland Plateau. The area is characterised by a highly variable topography with many ephemeral rivers (Kuisseb, Omaruru, etc.) and mountains such as the Brand Berg massif, which is the highest mountain in Namibia (culminating at 2 579 m above sea level), the Gamsberg (2 347 m), etc.

The Central Plateau

It extends north to south the full length of the country and is the area where major watersheds of most Namibian rivers are located. The northwestern parts of the Central Plateau present a rugged topography with broad valleys and inselbergs whereas the South is a flat stony plateau with few deep valleys.

The Kalahari Sandveld²

It is located east of the central Plateau and is characterised by deep sandy soils on top of bedrock and a monotonous flat topography. For the most part the soils are thick red soils,

² Word of Dutch origin meaning literally “sand field”.

except in the north where they are brittle alkaline. In the northwest where the Sandveld forms low, undulating dunes and shallow ephemeral river valleys called Omiramba (Bernard *et al.*, 1998).

1.2.2 Climate

Namibia's weather is the second driest in Africa after the Sahara. The climate is typified by the scarcity, extreme variability, and unpredictability of rainfall, which ranges from less than 100 mm on the coast to more than 700 mm at Katima Mulilo in the northeast. In most of Namibia, rain falls from November to April (summer) but rain occurs during winter in its southwestern corner.

Temperatures in Namibia can also be very variable ranging from well over 50⁰ C to under 0⁰ C in some parts of the country (Bernard *et al.*, 1998). These daily fluctuations are generally greatest in areas with lesser vegetative cover, though they vary little along the coastal desert and in the northeast.

1.2.3 Biological resources

People in Namibia rely heavily on biological resources to meet their needs in terms of food, fuel-wood, construction materials, medicinal plants, and fodder for their livestock. Even though it is one of the World's driest country, Namibia is a land with impressive, often, unique habitats and species. Its major ecosystem types can be classified into 2 broad categories.

The terrestrial and freshwater biomes

Terrestrial biomes: There are four main terrestrial biomes in Namibia, namely (i) desert, (ii) Nama-Karoo, (iii) succulent Karoo, and (iv) savannah (Bernard *et al.*, 1998). There are 4 344 higher plants species (many of which are endemic) and taxa recorded in Namibia, where dominant plant families are the Mesembryanthemaceae (vygies, 177 species), Poaceae (grasses, 422 species), Asteraceae (composites, 385 species), and Fabaceae (legumes, 377 species). The Welwitschiaceae monotypic family is represented by *Welwitschia mirabilis*.

Parts of Namibia's land area constitute the last major refuges for "red data mammals" such as the Grey Rhebok (*Pelea capreolus*), the African Wild Cat (*Felix sylvestris*), the Cheetah (*Acinonyx jubatus*), the Brown Hyena (*Hyena brunnea*), the Spotted Hyena (*Crotula crotula*) and the Bat-eared Fox (*Otocyon megalotis*) - *op. cit.*

Freshwater ecosystems: These ecosystems have a high ecologic, economic and social significance in an arid country as Namibia, even though most wetlands (5 % of the country's land area) are ephemeral. Inland wetlands concentrated in the northeast, and along the Atlantic shoreline are rich in species, hosting around 200 000 shorebirds during peak migratory seasons, and other tropical reptile fauna.

These ecosystems face major threats, which include habitat alteration due to agriculture and human settlement activities (over-fishing, overgrazing), pollution from offshore oil exploitation, and industrial development (dam construction disrupting natural hydrological flow).

The marine habitats

Namibia's ocean and coastal environments are among the world's most productive upwelling systems because of the influence of the Bengali Current system. These marine ecosystems, which support lucrative fishery industries, host many communities of organisms (205 seaweed species, 112 mollusc species, 410 species of bony fish, 83 species of cartilaginous fish, 184 diatom species of phytoplankton, and 243 copepod species of zooplankton). The Namibian marine waters host also sea turtles (5 of the 8 sea turtle species worldwide), seabirds (62 species), and mammals (8 species of baleen whales³, 23 species of dolphins and toothed whales, and the South African fur seal *Arctocephalus pusillus*) (*op. cit.*).

Threats to these marine biomes are mainly anthropogenic and include activities such as coastal diamond mining, and aggressive fishing with the removal of large quantities of organisms.

1.2.4 Water and land resources

Water availability in Namibia dictates the patterns of human settlement and migration and also the occurrence and distribution of fauna and flora. It is undoubtedly the country's most limited and, ultimately, most limiting natural resource.

Water resources

Globally considered, water resources constitute a scarce, but precious commodity.

Surface water: There are very few perennial rivers variably flowing in the northern (Kunene, Zambezi) and southern (Orange) borders (Bernard et al., 1998). During the rainy season, there are many ephemeral surface water points that are briefly available and particularly useful in some areas of the country, particularly in the central and western regions, where groundwater tables have dropped.

Groundwater: Namibia's fossil groundwater is widely exploited and, in general, groundwater sources are limited in quantity and/or quality⁴.

Major land resources

Namibia's land resources are defined by their major uses, which include: State protected areas, open communal lands, sub-divided and surveyed communal farmlands, tourist recreational areas, restricted areas for mining, and commercial farmlands as described in the following table.

³ Out of the 11 ones world-wide

⁴ Groundwater is characterized by a high salinity and is thus unusable for irrigation or human consumption).

Table 1: Major land uses in Namibia

Land tenure	Areas	Per cent of Total
State protected nature area	10 130 334 ha	12,26 %
Open communal area	26 596 707 ha	32,20 %
Sub-divided & surveyed communal farmland	5 764 533 ha	6,98 %
Tourist recreational area	727 382 ha	0,88 %
Restricted area for mining	2 538 177 ha	3,07 %
Commercial farmland	36 853 034 ha	44,61 %
Total	82 610 167 ha	100 %

Source: MET/DoF, National Remote Sensing Centre

These land use practices have been inherited from the “massive social-engineering policies of the colonial past” during which the best lands were given to white settlers while native black Namibians were squeezed on marginal lands where human and/or stock diseases are endemic (Bernard *et al.*, 1998).

Agriculture land use systems

Agriculture in Namibia is mainly one of dry-land farming, with heavy emphasis on livestock production that includes goats, cattle, sheep, ostriches and game mammals. Most of country’s agricultural land is suitable for ranching because of poor water availability and infertile soils. Only around 6,5 % of the land area is suitable for mixed arable farming. The limited availability of water only and salinization risks limit irrigation to less than 5 % of agricultural lands (Heyns, 1992). Subsistence farming on communal land is a very important activity for local black farmers who cultivate crops such as millet, sorghum, beans, pumpkin and melons.

1.3 Human factors: socio-economic characteristics

1.3.1 Population, demography

Population parameters

According to the 2001 census, Namibia has 1,8 million inhabitants. The urban population represents only 28 % of this total. The mean annual population growth rate between 1991 and 2001 has been established at 2,6 %. The mean fertility is 6,1 children per woman. The Namibian population is young with more than 42 % under age 15. It is characterized by a sex ratio of 94,8 men for 100 women, with an excess of women over men in all age groups. The average population density nationwide ranges, between only 1,5-1,6 persons/km². However 60 % of the residents (mainly black people) live in northern Namibia, where rainfall exceeds 400 mm/year. The majority of the population lives in areas representing less than 30% of the national territory.

Namibia features a mixture of ethnic groups ranging from the San People (Bushman), who depend heavily on veld foods, to white people of European origin who depend on agricultural and livestock products. The latter group reside in central and southern Namibia and enjoy in general, higher incomes. Between these two major elements of the Namibian population, exist

another nine main ethnic groups whose livelihoods depend, in many and different ways, on a mixture of agricultural, livestock and veld food commodities. Besides English (official language) several other tongues are spoken in the country, including Oshiwambo, Herero, Nama, Bushman, Afrikaans and German.

The country is facing a serious spread of HIV/AIDS, which reached a prevalence level of 19 % in 1998, with a higher prevalence rate among women compared to men, and also at a younger age (Rep. of Namibia, 2000).

The gender issue

In 1998 to achieve effective gender equity in the country the Government developed the National Gender Policy with the aim to bridge the gaps created by socio-economic, political and cultural inequalities among its citizens. This legal framework was followed by the development of a National Gender Plan of Action which seeks “to promote gender equality by empowering women through the dissemination of information, coordination and networking with stakeholders, mainstreaming of gender issues, promotion of law and policy reform, and monitoring of progress so as to ensure that women, men, children, and people with disabilities have full and equal participation in the political, economic, social and cultural development of the nation” (Rep. of Namibia, 1998).

Employment

In Namibia, the agriculture sector provides 37 % of country’s total employment. These jobs are in rural areas where they represent 63 % of rural employment. The Wholesale and Retail Trade sector, which includes the repair of motor vehicles, is the second largest employment provider with 8 % of the country’s total jobs. The other employment providers presented in decreasing order of importance are: Manufacturing (7 % of the total national jobs), Public Administration (6 %), Defence (6 %), Social Security (6 %), Education (5 %) and Construction (5 %) of the total national jobs.

The Labour Act (Act No. 6 of 1992) is the main legal document among several other legislation texts that regulate the labour and employment sector (Rep. of Namibia, 2000). In 1997, the Namibian government approved the National Employment Policies for Job Creation and Protection of Workers, which constitute a legal framework for the promotion and creation of employment. The NDP II anticipates an average annual employment increase of 22% over the period 1999-2006, at the same rate as population growth (MET, 2000 c).

1.3.2 Economic overview

From 1990 to 1994, the Namibian economy had a significant average growth rate of 4,9 %, compared to the 1,1 % recorded during the decade prior to independence. The National economy ranges from subsistence to modern, export-oriented and industrialized economy. Mining and agriculture are the two most important export-oriented sectors. In the early 1990s they accounted for about 40 % of the GDP and about 90 % of the total exports (Erkkilä and Siiskonen, 1992). The national economy depends on both imported goods (food, manufactured products, and technology), and exports (minerals, beef and fish). Like many other developing arid countries, Namibia’s economy is sensitive to variations in world market prices and/or climatic changes.

Mining

Mining is a major contributor of the Namibian economy as it accounts for 11-25 % of GDP, 70 % of export earnings, and 25 % of government revenues (CSO: 1995). This sector produces diamonds, uranium, copper and other base metals (gold, zinc) for export. There are also interesting prospects for offshore oil and gas. The mining industry remains extremely influential despite the drop of its contribution to GDP to about 11 % in 1995, due to economic diversification and fluctuations of the global market prices (Bernard *et al.*, 1998).

Agriculture, fisheries and tourism

Namibia is mainly an agricultural country, with important marine fisheries, and tourism activities. The subsistence agricultural sector contributes only 1,5 % of GDP, but is essential to the livelihood of about 70 % of the population. This paradox induces limitations to the utilization of GDP as a meaningful index of economic activity in Namibia.

Commercial marine fisheries and, to a lesser degree, subsistence inland fisheries are also important in Namibia. In 1997, the fishing industry contributed 8,5 % to GDP. Inland subsistence fisheries play an important role in the livelihood of many people. Fish harvesting from perennial and seasonal wetlands is very important to the subsistence economies of many people in the north and northeast of the country.

Besides mining and agriculture, two other important sectors in the Namibian context are conservation and tourism, which have lately increased their contribution to the GDP. Environment-centred tourism (eco-tourism) is a booming business in Namibia because of the many assets the country has to offer, namely its “scenic grandeur, rich wildlife, diverse habitats and excellent infrastructure” (Bernard *et al.*, 1998). On average, over 500 000 tourists visit Namibia every year and mostly from neighbouring countries (South Africa, Angola and Botswana) and European nations (Germany, United Kingdom, France, Italy). In 1999, the tourism industry contributed 9,6 % of GDP.

Forestry

The importance of the forestry sector to the Namibian economy is only accounted for through its contribution in terms of the commercial timber industry. However, forests and woodlands contribute in numerous other ways and support the majority of Namibians by providing food, fuel, construction materials, tools and medicinal plants. Sales from the craft industry generate over N\$ 20 million income/year for rural craftspeople. Forests and woodlands support the charcoal industry, which is evaluated at N\$8 million/year. They also provide browse and grazing for livestock farming, as well as habitat, browse and grazing for game, that so valuable to the tourism industry and other ecological and socio-cultural functions.

The total economic value of the Namibia's forest resources was evaluated, in 1996, at N\$1 058,2 millions (MET/DoF, 1996).

1.4 Food security and consumption trends

The main limiting factors for the improvement of the agriculture sector and thus for the reduction of related food shortages include the following: (i) low institutional capacity, (ii) shortage of good arable land, (iii) low and erratic rainfall, (iv) uneven distribution of land that limits its access to more than 70 % of the population, (v) increasing population, (vi) high

rural-to-urban exodus, and (vii) unfavourable marketing strategies for agricultural goods (Rep. of Namibia, 2000).

1.4.1 Food Security

Large segments of the population face food-related problems in Namibia and survive below satisfactory nutritional status. The report of the National Workshop on the NDP I indicates widespread under-nutrition among children less than five years old and specifies that, nationwide, 28 % of children were stunted, and 26 % underweight. Besides, over two-thirds of the Namibian population suffers from disorders caused by moderate to severe iodine deficiencies (Rep. of Namibia, 2000). The Government has taken actions to address these problems by establishing a Food Security and Nutrition Development Programme under the responsibility of the MAWRD.

1.4.2 Consumption trends

The consumption trend in Namibia was below GDP from 1991 to 1996, when it rose a little over GDP until 1998. The last three years, the level of consumption in the country has come back to below GDP level (Rep. of Namibia, 2000).

1.4.3 Energy consumption patterns

Namibia's energy resources are of two types, namely commercial and traditional forms of energy.

Commercial forms of energy include liquid fuels, electricity and coal, and amount to 82 % of energy consumption of which petroleum fuels represent 70 %. Mining and fishing are two key contributors to GDP in Namibia. They are energy-intensive industries and are largely responsible for the country's high-energy consumption ratio⁵. Between 1995 and 1999, consumption trends of commercial energy resources have varied according to energy forms:

- Electricity and coal consumption has decreased because of a decline in the mining sector during the same period;
- On the other hand, liquid fuels consumption showed higher levels of growth, mainly because of a strong transportation demand and pricing policies (Rep. Namibia, 2000).

Traditional forms of energy (wood, charcoal and dung) account for only 18 %, even though they are the main energy source for about 60 % of Namibians.

⁵ This ratio is the proportion of energy consumption to GDP. For Namibia, this ratio is 15 % as compared to, for example, 7 % for Japan (Rep. Namibia, 2000).

2. Forest resources: current status and management

Forestry development in Namibia was neglected before independence. The only past efforts of the colonial German government were in the environmental protection of woody vegetation, particularly that of riverine forests and unsuccessful attempts to develop planted forests to limit timber imports in support of the colonial economy (MET/DoF, 1996).

Later, during South African domination, the policy of nature conservation shifted, gradually, to one of forest exploitation, mostly in the communal areas of the Tsumeb and Grootfontein regions.

Since 1900, forestry has been a Namibian national prerogative, put under the responsibility of the Directorate of Forestry within the Ministry of Environment and Tourism. The forestry sector has since, undergone a comprehensive institutional reform.

2.1 *Forest inventory and information systems*

In general, information on the forests and other woody biomass and vegetation types is very limited in Namibia. The reasons of this shortage of information and data include the country's weak colonial legacy as far as forestry is concerned, and the relatively recent creation of the Directorate of Forestry, main institution directly involved in forestry data collection, analysis and dissemination.

The DoF, in cooperation with FINNIDA, initiated a National Forestry Project in order to secure data and information on Namibia's northern woodlands. The National Forest Inventory (NFI) Project is a sub-component of the Namibia-Finland Forestry Programme, which aims to support the DoF's current efforts to develop its human resource capacity in order to be able to:

- Perform scientific research to generate data and information needed for forest management;
- Manage forest resources accordingly.

Current data and information available are disseminated through the Directorate's monthly, quarterly and annual progress reporting system, and include: number of seedlings raised, number of harvesting permits issued, revenues generated from harvesting permits, fines, timber contracts, and exports of forest products.

Data from the forest inventory sub-component are published in inventory reports. To date, there exist four regional⁶ inventory reports as well as a series of other inventories carried out in other parts of Namibia. The reports concerning the latter are as follows:

- "Woody Resources of Western Tsumkwe";
- "Woody Resources of East and South Tsumkwe, Otjinene, and Okakarara Districts";
- "Forest Inventory Report of Ongadjera Community Forest";

⁶ These regions of north and north-eastern Namibia are Omasuti, Oshana, Oshikoto, and Caprivi regions

- ‘Forest Inventory Report on Uukwaludhi Community Forest’;
- ‘Forest Inventory Report on Nkurenkuru Concession Area’ and;
- ‘Inventory Report of the DoF *Eucalyptus* plantations in Kavango Region’.

All these inventory documents are available at the DoF. They provide quantitative estimates of the forests in terms of: (i) areas by vegetation structural types, (ii) areas by dominant species, (iii) distribution of crown cover of dominant species by crown cover classes, (iv) total number of stems, (v) stems/ha, (vi) tree volume, and (vii) mean volume by species and for the whole area.

2.2 Characteristics of the forest estate

The forest sector in Namibia can be defined by its consumption of wood and wood products and the existence and use of its extensive dry woodlands and wooded savannahs.

2.2.1 Total forest estate

Namibia’s vegetation includes Desert (16 %), Savannah (64 %) and woodland (20 %) types. However, from a Namibian forestry point of view, only the north and northeastern woodlands are considered as forest areas.

Between 1993 and 1996, the Directorate of Forestry, with the support of the Swedish Government, carried out a forest cover mapping project, using satellite imagery to assess the extent of forest cover in northern Namibia. Table 2 presents a summary of estimated area of land cover.

In terms of forest cover change, up to the present there have been very few attempts to determine the extent and yearly rate of deforestation in Namibia. In 1995, forests covered 12,4 million ha (Erkkilä, 2001) and during the period 1990-1995, the estimated annual loss of forest cover was 42 000 ha giving an annual rate of deforestation of 0,3 % (FAO, 1997). This is comparable to the information from the Ohangwena region in Northern Namibia where, using satellite images and aerial photography, forest cover change has been estimated to be around 0,5% between 1981 and 1992 (Erkkilä and Löfman, 1999).

Table 2: Area of land cover in Namibia

Land cover	Area (ha)	% of area
Extensive/subsistence cultivation (mainly in forest and savannah areas)	1 823 936	6,42
Intensive cultivation (permanent agriculture)	89 694	0,32
Forest (areas with trees > 5 m height)	7 357 876	25,88
Savannah (areas with trees < 5 m height)	15 465 511	54,40
Other (areas without woody vegetation: open water, grasslands, pans)	3 693 110	12,98
Total	28 430 127	100,00

Source: State of Deforestation in Namibia (Hailwa & Chakanga, 2001, unpublished).

Information pertaining to growing stock is rather limited. In general, growing stocks vary considerably both across and within vegetation types, probably because of edapho-climatic variations.

2.2.2 Natural forests

The natural vegetation of Namibia consists of semi-closed woodlands, in which dominant trees species are *Baikiaea plurijuga*, *Burkea africana* and *Pterocarpus angolensis*, woodlands with *Colophospermum mopane*, and several variants of savannahs. Extensive natural dry-woodlands occupy about 20% of Namibia's territory, while wooded savannahs dominated by various acacia species, shrubs and grasses cover another 54 % of the land area.

For the purposes of the NFI and forest management planning in Namibia, forests are defined as “woody vegetation formations that provide at least 15% ground cover and a mean height of 4 meters”. This new DoF definition, which departs from FAO's terminology that was used at the start of the national forest inventory, has been adopted because it has more practical significance in Namibia. Indeed, it allows the inclusion of substantial *Acacia* and *mopane* woodlands, which produce considerable woody biomass for “a lucrative and environmentally sustainable charcoal producing industry”.

Woodlands are found mainly in the Kalahari Sands, which are predominant in the Tsumkwe, Kavango, Ohangwena and Caprivi Regions of north and northeastern Namibia. The tallest tree species belong to *Pterocarpus angolensis*, *Baikiaea plurijuga* and *Burkea africana* and in some places, *Terminalia sericea*. The next prominent woodland type is the mopane woodland.

In general the highest forests are found along the rivers in the northeastern parts of Namibia and the mopane woodlands in the wetter Eastern Caprivi, in which maximum heights of 21 meters and densities of 140 trees/ha and a ground cover of 25 % have been recorded.

The following paragraphs give a brief description and present summary estimates for the four northern regions (Caprivi, Oshikoto, Oshana, & Omusati) where forest inventories work have been completed.

Caprivi region

The Caprivi region covers 2 009 527 ha in the north and most the eastern part of the country. It has been classified into the “Tree Savannah and Woodland” vegetation zone (MET/DoF, 1998). Its soils are sandy, the landforms consist of dunes and dune valleys, and the mean annual rainfall is 700-mm, while the average elevation is 960 m above sea level.

The forests (trees > 5m) cover 1 632 743 ha and the savannas (trees < 5 m) 15 216 ha. About 5 % of the forest category and 18 % of the savannah are extensively cultivated.

The whole area has an average of 86,65 trees per hectare (total number of trees is 142 798 780) and a mean volume of 21,37 m³/ha. The following table gives summary statistics for the most common species.

Table 3: Summary statistics for the forests in the Caprivi region

Species	Total # of stems	Aver. stems/ha	Mean vol./ha	Total volume
<i>Baikiaea plurijuga</i>	12 127 410	7,37	6,02 m ³ /ha	9 915 120 m ³
<i>Burkea africana</i>	22 415 520	13,60	2,71 m ³ /ha	4 461 130 m ³
<i>Colophospermum mopane</i>	21 020 640	12,76	2,23 m ³ /ha	3 668 660 m ³
<i>Terminalia sericea</i>	23 244 900	14,11	2,03 m ³ /ha	3 344 070 m ³
<i>Pterocarpus angolensis</i>	3 686 760	2,24	0,59 m ³ /ha	968 200 m ³

Source: Forestry Inventory Report of Caprivi Region (MET/DoF, 1998).

It is interesting to note the huge difference between the available growing stocks of the two main commercial saw-timber species (*Pterocarpus angolensis* and *Baikiaea plurijuga*). This is mainly due to the over-exploitation of the former for its excellent timber quality for furniture. The average saw log timber volume for *B. plurijuga* is 0,75 m³/ha whereas it is only 0,06 m³/ha for *P. angolensis*.

Oshikoto region

The region covers 2 656 523 ha divided into commercial farms (957 049 ha) and communal lands (1 699 474 ha of which 53 073 ha are grasslands and “oshanas”). The forest inventory concerned the communal lands’ forest and savannah vegetation types only. It did not include grasslands and “oshanas”. The region’s average stocking is 128,67 trees/ha and the mean volume 11,64 m³/ha. The total volume for the area inventories is 18 833 980 m³ (MET/DoF, 2002).

Table 4 below presents summary statistics of the main vegetation types of the area included in the inventory. The table reveals that forests in the region cover only about 0,6 % of the area inventoried and are relatively dense although the average volume (42,1 m³/ha) is low.

Table 4: Volumes and number of trees in main vegetation types (Oshikoto region)

Items	Forest	Closed Woodland	Closed Shrub-land	Open Shrub-land	Thicket	Bush-land
Total # of stems (103)	11 775,0	46 109,0	4 547,00	1 852,0	120 802,0	26 667,0
Total volume (103 m ³)	834,8	5 015,2	510,5	171,7	10 840,7	1 461,1
Stems/ha	594,1	253,1	64,4	25,8	255,9	104,6
Mean volume (m ³ /ha)	42,1	27,5	7,2	2,4	22,9	5,7

Source: Inventory Report on the Woody Resources in Oshikoto Region (MET, DoF, 2002).

The vegetation types in Oshikoto have a patchwork aspect and are characterised by large variations in volumes as shown in the inventory results. The latter indicated that of the measured clusters, there were 15 % with volumes greater than 30 m³/ha, 23 % with volumes between 10 and 30 m³/ha, 24 % with volumes lower than 10 m³/ha, and 39 % were empty (MET/DoF, 2002).

There is no forest industry in the region. The wooded areas provide fuel-wood, poles, and non-forest products including fodder.

Oshana region

Situated in the north-central part of the country, this region covers about 510 000 ha. With 25 inhabitants/km², it is the most densely populated region of Namibia. Its topography is flat, and its soils are predominantly sandy. The Oshana region has a relatively poor drainage system. Average rainfall varies from 180 mm in the southern part of the region to 710 mm in its more populated northern part (MET/DoF, 2000 d).

The inventory covered 50,5 % (259 675 ha) of the region. It revealed that 80 % of the area studied has little or no woody vegetation. This is due to deforestation resulting from over-harvesting, and also to poor soil conditions that prevent woody vegetation from developing to tree size. The wooded areas in Oshana region are used for fuel-wood, poles, and NWFP, including fodder.

The dominant species in terms of area covered expressed in percent of the total area, are *Colophospermum mopane* (47,4 %), *Diospyros mespiliformis* (17,6 %), *Acacia nilotica* (11,2 %) and *Sclerocarya birrea* (10,0 %). Both the total volume (465 600 m³) and the mean volume per hectare (1,79 m³/ha) are very low as indicated in table 5, which details information pertaining to woodlands, bush-lands and shrub-lands of the whole Oshana region.

Table 5: Volumes and number of trees in the main vegetation types of the inventoried area (Oshana region)

Items	Vegetation types				
	Woodland		Bush-land	Shrub-land	Grassland
	Closed	Open		Closed	
Total # of stems (10 ³)	774,1	711,5	147,4	1 312,3	184,7
Stems/ha	100,8	16,8	40,7	14,4	3,4
Total volume (10 ³ m ³)	21,0	376,7	6,9	17,7	32,3
Average tree volume (m ³ /ha)	2,7	8,9	1,9	0,2	0,6

Source: Inventory Report on the Woody Resources in Oshana Region (MET, DoF, 2000 d).

Omusati region

The Omusati region, situated west of the Oshana region, covers 1,39 million ha. Its annual rainfall ranges from 350-500 mm. The topography of the region consists of an extremely flat plain, except in its west-most part. Table 6 details the region's main vegetation types.

Table 6: Volumes and number of trees in the main vegetation types of the Omusati region

Items	Vegetation types					
	Woodland		Shrub-land		Thicket	Bush-land
	Closed	Open	Closed	Open		
Total # of stems (10 ³)	9 904,8	8 477,4	6 926,5	658,9	6 154,8	6 017,3
Stems/ha	102,8	45,0	17,5	4,6	109,8	58,4
Total volume (10 ³ m ³)	667,0	1 599,5	210,8	755,0	412,4	372,7
Average tree volume (m ³ /ha)	6,9	8,5	0,5	5,3	7,4	3,6

Source: Inventory Report on the Woody Resources in Omusati Region (MET, DoF, 2000 e).

The most abundant species (assessed in percent of total trees measured) are, in order of importance *Colophospermum mopane* (61,1 %), *Combretum collinum* (7,7 %), *Terminalia prunoides* (7,4 %), *Terminalia sericea* (4,1 %), *Acacia erioloba* and *Commiphora angolensis* both with 3,5 %. The whole region counts on average 32,6 trees/ha, a mean volume of 3,2 m³/ha and a total tree volume of 4 449 500 m³ (MET/DoF, 2000 e).

2.2.3 Planted forests

Planted forests are very limited in Namibia. Existing plantations cover 300 ha countrywide and consist of exotic trees, including different species of Eucalyptus. The minor development of tree planting is attributed to the lack of interest of the colonial rulers and to a difficult environmental setting for planting, including harsh climatic conditions and poor soil properties.

Some 73,3 ha of Eucalyptus trial plantings established in the Kavango region⁷ were inventoried in 1999. The results (see details in table 7) reveal that trees display poor growth performances. The periodic annual growth since planting is less than 4 m³/ha/year in the Musese, Kaisosi, and Ndiyona sites. Only the youngest plantation at Kahemu has a periodic annual growth close to 5 m³/ha/year.

Although the DoF is not in possession of their silvicultural history, the growth rates of these trial woodlots do not give a clear indication of the potential of the sites to support tree-planting efforts. There is room for improvement through research activities and introduction of additional species and provenances, along with investigations into silvicultural techniques such as timing and methods of planting, frequency and intensity of weeding etc.

Table 7: Summary statistics of the Eucalyptus trial woodlots in Kavango region

Items	Whole area	Musese (1967, T)	Kahemu (1987)	Kaisosi (1979)	Ndiyona (1978, T)
Area (ha)	73,3	3,6	24,0	35,7	10,0
Total Volume (m ³)	3 467,7	460,3	1 412,8	826,5	768,1
Volume/ha (m ³ /ha)	47,3	127,9	58,9	23,2	76,6
Total trees	52 770,0	5 310,0	22 300,0	16 660,0	8 500,0
Trees / ha	720,0	1 475,0	929,0	466,7	850,0
Mean dbh (cm)	10,3	11,4	10,0	9,26	12,2

Source: Inventory of the Directorate of Forestry *Eucalyptus* plantations in Kavango region (MET/DoF, 1999).

Tree planting efforts are advocated by both the “Development Forestry Policy for Namibia” and the country’s “Forest Act of 2001”. However on the ground, afforestation/reforestation programmes are still in their infancy. Despite the harsh and dry environment, which hampers tree-planting activities in Namibia, there is a huge potential to establish plantations, mostly

⁷ Trials established at: Musese (about 2 km north of Rundu), Kahemu (east of the Musese Trial Woodlot), Kaisosi (about 100 km north of Rundu), and Ndiyona (about 2 km north of Rundu).

through agroforestry technologies, to meet local peoples' needs for fuel-wood, construction poles, and fodder. In this regard, there is need for trials in plantation development through the DoF's research division and other related institutions. However, financial resources, technology and expertise to develop plantations in a dry environment presently limit this activity.

2.2.4 Trees outside forests

In Namibia, trees outside forests are mainly those locate on agricultural fields, within human settlements (urban forestry, village woodlots), and trees existing in scattered formations in the savannahs and arid zones. They also include trees planted in community forestry activities, which are mainly trees used in agroforestry systems.

The majority of Namibians live in the north where they have traditionally converted woodlands, savannahs, and strips of riverine lands into cultivation fields and pastures. However, trees with specific values are often left in agriculture fields. These include those producing fruits, oil nuts, medicinal extracts, or the ones conserving/enhancing soil fertility, and shade trees are often left in agricultural fields. These trees include species such as *Colophospermum mopane*, *Sclerocarya birrea* (Marula), *Berchemia discolor*, *Strychnos spp*, *Diospyros mespiliformis* (for fruit production), *Lonchocarpus nelsii* (fodder), *Guibourtia coleosperma* (oil nuts), *Faidherbia albida* and *Acacia erioloba*⁸. Trees left in agricultural fields include species producing raw material for crafting (*Hypheane petersiana*) or medicinal products (*Harpagophytum procumbens*, Devils' Claw).

The importance of trees outside forests (TOFs) is highlighted in the new Forest Act of 2001 and the Nature Conservation Ordinance Amendment Act of 1997. Both pieces of legislation prohibit the wilful destruction of trees and other woody vegetation on agricultural lands and elsewhere, without a permit or approved land use plan. Customary laws also ban the destruction of fruit trees, and, in some local cultures, cutting a fruit tree is punishable through a fine determined by a traditional court.

The government agencies concerned with trees outside forests TOFs are mainly under the MET, but other ministries such as the MAWRD, the MRLG and the MWA are also interested in TOFs because they contribute significantly to food security, generate incomes and diversify farm revenues.

The areas occupied by the various types of TOFs are unknown but are very small compared to those classified as woodlands and wooded savannas. The main TOFs' systems existing in Namibia are the:

- Homestead plantings that consist mainly of high value shade and fruit trees, whose intensive care is warranted especially during their establishment phase, when scarce water is spared for their tending;
- Farm woodlots currently being promoted by the DoF among farmers and community groups;

⁸ *Acacia erioloba* produces relatively big and highly nutritious indehiscent pods favoured by livestock.

- Live fencing which is used traditionally in the form of quickset hedges, but is not as common as dead hedges erected using wooden stakes, palisades and thorn bush fence types to protect crop fields;
- Urban forestry which includes trees in parks, in public gardens, and along roadsides, all of which are under the responsibility of Municipal Affairs.

2.3 Tool box for sustainable forest management

2.3.1 Criteria and indicators for sustainable management

In October 1999, the DoF, with the assistance of the Namibia-Finland Forestry Programme started a consultative process to develop national criteria and indicators (C&I) for sustainable forest management in Namibia. The goal of this endeavour is to have a set of C&I for monitoring and evaluating progress towards sustainable forest management in the country (MET/DoF, 2001 a).

The framework used for this process adapted the C&I for sustainable forest management developed for the SADC countries by UNEP/FAO (Dry-Zone Africa Process). These C&I were discussed and adapted to Namibia's own circumstances during a first workshop (October 1999) which gave mandates to three national groups working on forest resources management, environmental and socio-economic issues. These working groups including all main stakeholders prepared a draft set of C&I for Namibia, which was discussed in a second workshop held in February 2000.

The following is a summary of the agreed upon set of C&I, which are classified into three different areas, namely forest resource, environmental and socio-economic criteria.

Forest resource criteria

There are three such criteria, which deal with forest resources and their sustainable management:

1. Criterion 1 is called "Development, maintenance and improvement of forest resources, including their contribution to global carbon cycles" illustrates the existing situation regarding forest coverage and growing stock (biomass); it also includes agroforestry systems and trees grown on farmlands.
2. Criterion 2 is called "Maintenance and enhancement of productive functions of forest and other wooded lands", deals with the structure and annual change of the growing stock; it also covers aspects of forest management through monitoring of areas under effective management.
3. Criterion 3 is called "Maintenance and enhancement of woodland's contribution to sustainable range management", addresses issues related to the management of communal and commercial rangelands specifically, by addressing the problem of bush encroachment using the ratio between woody vegetation and grass in wooded rangelands.

Environmental criteria

Three criteria deal with: (i) management, conservation and maintenance of environmental values and functions; (ii) maintenance of biological diversity; and (iii) maintenance and enhancement of environmental functions and ecosystem health of forests and other wooded lands:

1. Criterion 1 is called “Management and maintenance of environmental values and functions of forests and other wooded lands”, this criterion concerns the assessment of environmental values and functions in the Namibian context and their maintenance through strategic forests’ establishment on the ground. Assessing these values is based on the differentiation of strategic forests in the following categories of: ecological, socio-economic, cultural, aesthetic or scientific purpose. The actual forested areas set aside for conserving the environmental values and the areas of forests that are under different land use management categories (community forests, conservancies, state forests, concessions, state protected areas or private conservation areas) are used as indicators.
2. Criterion 2 is called “Conservation and maintenance of biological diversity of forests and other wooded lands” deals with various biodiversity conservation issues such as ecosystems, species and genotypes. The ecosystem indicators address the area of vegetation types ranked in terms of their importance as regards forest biodiversity (biodiversity types) under various land management categories. As per the “Environmental Atlas”, there are 29 general vegetation types in Namibia; the species’ indicators deal with the change in number of species within a given forest and with the change in the status of nationally or IUCN/CITES red-listed species; The genotype indicators are related to the change in the status of IUCN/CITES forest related genotypes worthy of conservation.
3. Criterion 3 is called “Maintenance and enhancement of environmental functions and ecosystem health of forests and other wooded lands” addresses various disturbances affecting environmental values and forest health using as indicators total area of forest actively managed to reverse these effects, and changes in regeneration of key forest species.

Socio-economic criteria

This criterion, which addresses “The maintenance and enhancement of socio-economic benefits of forests and other woodlands”, uses the following three categories of indicators:

1. Macro economic indicators that indicate the share of the forest sector to GNP, the forest sector’s trade balance, the number of people employed in the forestry sector, and the levels of investment in forest and forest industries including the informal sector.
2. Economic value indicators that trace: (i) the value of wood products and non-wood products; (ii) the value from secondary industries; (iii) the value from biomass energy and; (iv) the economic value of eco-tourism.
3. Community benefits indicators that depict the benefits to the local communities (youth and women), the contributions to food security and the levels to which social/cultural needs are met in forest policy implementation.

2.3.2 Management and Planning

2.3.2.1 Institutions directly in charge forest management planning

Ministry of Environment and Tourism

The MET and its leading institution in charge of forestry affairs, the DoF, have the main responsibility for planning and implementing forestry activities. In addition to the forestry sector, the MET has mandates over three other important sectors (Wildlife, Environment and Tourism) that complement each other with the forestry sector. The MET is also responsible for the supervision of a number of international conventions related to issues pertaining to sustainable use, sound environmental management, and conservation of natural resources;

The Directorate of Forestry

The DoF, which is in charge of forestry development, is still in its early developmental stages. Its activities are handled by three Divisions, namely: (i) Management, (ii) Research and (iii) Training & Extension. It counts 15 offices throughout the country. Under the Management Division are three Regions (Northeast, Northwest and South-Central), which are operated by Chief Foresters. Each Region has District Forest Offices manned by District Forest Officers who are key personnel in direct contact with local communities.

2.3.4.2 Planning

Through the Government of Namibia, the DoF has initiated the following:

Desertification Control Programme

In 1994, the Government of Namibia initiated a National Programme to Combat Desertification (NAPCOD) which aims to combat the process of desertification by promoting the sustainable and equitable development of natural resources suited to the country's variable environment for the benefit of Namibians, both present and future. The main objectives of this programme are to:

- Establish mechanisms for information collection and analysis regarding desertification issues in Namibia;
- Identify key players and establish / improve their capacity;
- Develop integrated planning strategies at all levels on the basis of clearly defined policies; and implement appropriate interdisciplinary research programmes;
- Provide appropriate training and education according to needs at all levels;
- Empower natural resource users and managers to plan and implement sustainable management practices.

Forestry Strategic Plan

The DoF produced the first Forestry Strategic Plan for Namibia in 1996, and began its implementation in August 1997, with the start of the “Namibia-Finland Forestry Programme”.

- Forest management and harvesting practices are regulated by the orientations of the Namibian Forestry Strategic Plan and the Forest Act promulgated in 2001 in replacement of the previous one initiated in 1968. Harvesting of woody forest products is controlled through the permits system of the DoF. To date there is no piece of legislation regarding the harvesting of non-wood forest products;
- Through the Forestry Stewardship Council, Namibia has pursued certification requirements of some forest products, to enable them to access the international market places of Europe and of the USA. The products concerned are currently exported to Europe and to the USA, are charcoal, Marula oil (from kernels of *Sclerocarya birrea*), and ground up roots of devil's claw (*Harpagophytum procumbens*) for medicinal purposes.

2.3.4.3 *International cooperation*

At the international level, Namibia supports and subscribes to the principles of UNICODE and has also taken part in the IPF and IFF processes. The Government has fully supported the initiatives to develop criteria and indicators for sustainable forest management, and the country has developed and adopted its own set of C&I.

The Namibian Government is supported in its efforts towards the conservation and development of its forest resources by external assistance from various partners.

The Finnish Government

Under the Namibia-Finland Forestry Programme (NFFP), whose overall objective is to ensure an increased role of forestry in the socio-economic development of Namibia through continuous implementation and development of sustainable forest management practices. The NFFP consists of three main components:

- Institutional Development for capacity building through development of management information systems, and short and long-term (Diploma and BSc) training of Forestry staff;
- Participatory Integrated Forest Management through formulating models of sustainable integrated forest management to be implemented in communal lands by Namibians;
- Information and Planning to gather various types of forest information to use in management planning and monitoring of forest resources. It comprises three sub-components: National Forest Inventory, National Remote Sensing Centre and Forest Management Planning Unit.

The Government of Germany

Through two 'Community Forestry Projects':

- "Community Forestry" project is piloted by the NGO German Development Service (GDS) in Northeast Namibia, its objective is to assist local communities in the preservation and sustainable use of the natural forests in that part of the country. The project seeks the empowerment of communities to protect their forests against illegal

exploitation by both outsiders and members of the community itself, and to manage them sustainably for socio-economic and ecological benefits;

- “Okongo Community Forestry Project” is supervised by SADC/GTZ, aims to promote community forestry within the Okongo area by providing legal and technical support that would enable community members to manage in a sustainable way their forest resources so as to derive added benefits.

The Danish Government

Through “Community Forestry and Extension Development Project” in Oshana, Oshikoto and Ohangwena Regions. The aim of the project is to address the problem of unsustainable land management practices focusing on interaction of people and their livestock with the natural environment.

2.4 Production, economic and social significance of forests

2.4.1 Forest production

The DoF estimated in 1996, the total economic value of forest resources to be N \$ 1058,2 million. Table 8 presents the breakdown of the forest values by product.

Table 8: Estimated annual economic value of forest resources exploitation)

Products	Main species	Value ⁹	Products	Main species	Value
Tourism	Ecosystem	218,0	Construction poles	Mopane	383,0
Firewood	Mopane, Acacias	131,0	Fencing (protection)	Mopane	175,0
Medicine	Various species	31,5	Crafts implements	Various species	21,0
Kraals	Mopane	31,0	Mahangu baskets	Mopane	12,4
Charcoal	Various bush invaders	22,4	Goat forage	Various species	9,5
Food	Sclerocaria ¹⁰	4,6	Fencing poles	Mopane	6,6
Basketry	Hyphaene species	4,0	Commercial logging	Pterocarpus, Baikia	2,4
Beverages	Various species	1,5	Mortar and pestles	Various hardwoods	1,5
Carvings	Various species	1,0	Ornamental roots	Mopane	1,1
Food	Mungite kernels	0,2	Mopane worm forage	Mopane	0,5
<i>Sub-total</i>		<i>445,2</i>	<i>Sub-total</i>		<i>613,0</i>
Total economic value = 1 058,2 million N \$					

Source: Namibia Forestry Strategic Plan, 1996.

In 1996, the DoF estimated the total economic value of forest resources to be N\$ 1058,2 million.

⁹ Million Namibian dollars (N\$).

¹⁰ Marula oil.

2.4.2 Wood products

Available data on consumption of industrial wood (fibreboard, plywood, sawn wood, veneer sheets, and pulp) show important increases between 1995 and 1998 as it appears in Table 9.

Table 9: Consumption of wood products in Namibia (1995-1998)

Wood products	Units	Year					Total Imports
		1995	1996	1997	1998	1999	
Charcoal	Tons	3 989	845	587	670	683	6 773
Household and Sanitary	Tons	8 422	47 646	34 843	74 390	79 129	244 430
Newsprint	Tons	198	193	191	163	76	722
Paper and Paperboard	Tons	43 700	10 867	11 174	20 470	23 938	110 149
Fibre-, Particle-, Wafer-board	Tons	1 656	3 870	3 071	4 341	6 037	18 976
Plywood	Tons	88	450	1 023	2 329	600	4 489
Printed Matter	Tons	4 498	7 229	3 487	5 797	3 330	24 340
Pulp	Tons	90	523	358	1 313	389	2 673
Sawdust	Tons	216	708	40	234	177	1 376
Veneer sheets	Tons	180	177	152	32	218	758
Wood wool	Tons	53	43	89	17	2	203
Wrapping and Packaging	Tons	241	82	380	364	185	1 252
Chip wood	m ³	4 635	6 578	7 277	15 073	12 667	46 230
Fuel wood	m ³	359	357	153	343	276	1 488
Round wood	m ³	1 263	2 340	2 998	4 564	4 693	15 859
Sawn wood Hard	m ³	1 232	636	682	1 929	701	5 180
Sawn wood Soft	m ³	3 307	3 880	4 106	6 984	8 725	27 002
Sleepers	m ³	323	55	6 935	1 212	173	8 699
Value in million N\$	m. N\$	351 851	366 861	418 811	542 293	507 049	2 186 866

Source: Bureau of Statistics, National Planning Commission

The jumps in consumption of wood and wood products are due to construction booms after independence. The Namibian government is engaged in finding ways to reduce its high cost of imports, which come mainly from other parts of the SADC region.

2.4.3 Wood energy – Global statement

Fuel-wood and charcoal are the major sources of domestic energy in Namibia. The total commercial consumption of wood fuels (including charcoal) is around 152 864 tons/year and the subsistence consumption in rural and urban areas about 519 467 tons/ year (Klaeboe and Omwami, 1997, cited by Kojwang, 2000 b). Savannahs and woodlands supply most of the woody biomass used for fuel-wood and charcoal production. Recent inventories in these vegetation types have shown that in the camel-thorn savannah, the total above ground biomass is around 3,2 tons per hectare whereas it ranges from 12,5 to 20,6 tons per hectare in the woodlands (Kojwang, 2000 b).

2.4.4 Fuel-wood

Woodlands provide most of the fuel-wood used for cooking and lighting in low-income urban households and in rural areas. In the latter, fuel-wood is harvested from communal lands, where clans and villages have traditional user rights for grazing and gathering various products. In the urban centres of the central and southern regions, commercial farms provide charcoal and unprocessed barbecue wood, while in northern urban areas traders haul wood into towns and sell it to retailers.

Despite the existence of a permit system to harvest, transport and market, about 50% of the wood production is still harvested illegally. Moreover, data on fuel-wood used in rural areas are almost non-existent because past energy policies and development priorities were biased towards commercial farms, industry and urban areas. The main attempts to assess fuel-wood and charcoal consumption have been through:

- A study performed in 1992 by the Namibia Institute for Social and Economic Research (NISER). This energy consumption, marketing and distribution survey showed that in the former Ovamboland (north) 90 % of the households use firewood for cooking (0,567 kg/person/day). The study also revealed that 80 % would prefer using electricity as most people in Katutura Community, in Windhoek;
- A DOF study conducted in 1996 showed that in the major towns of Namibia, daily fuel-wood consumption rates for main users were up to twice as large as those of occasional users as indicated in Table 10. It also appears also that both occasional as well as main users in Rundu (in the northern and most forested part of the country) tend to use more firewood than other cities.

Table 10: Daily fuel-wood consumption in major Namibian towns

Town/City	Fuel-wood daily consumption (kg/person)		Ratio main over Occasional user
	Main users	Occasional users	
Windhoek - Katutura	0,83	0,42	1,98
Towns in "Ovambo"	0,69	0,41	1,68
Rundu	1,08	0,62	1,74
Windhoek Main and Khomasdal		0,17	-

Source: Adapted from Kojwang, (2000 b)

The same survey estimated the firewood consumption distribution in rural areas of Namibia and indicated that the total consumption of firewood/household ranged between 1-1,5 tons in 1996 (see table 11). For the same year, the estimates and associated values of total firewood consumption in Namibia were as indicated in Table 12.

Table 11: Firewood total and daily household consumption in rural Namibia (1996)

Administrative Regions	Daily Consumption	Total Consumption
Kavango, Caprivi	1,50 kg/household	107 000 Tons
Kunene, Erongo, Otjozondjupa, Omaheke, Khomas	1,30 kg/household	100 000 Tons
Omusati, Ohangwena, Oshikoto, Oshana	1,00 kg/household	228 000 Tons
Hardap, Karas	1,00 kg/household	25 000 Tons
Total	-	460 000 Tons

Source: Klaeboe J. and R. K. Omwami: *Forest Policy for Sustainable Utilization of Woodlands and Savannahs of Namibia: A study on consumption patterns of major wood and wood products in Namibia* – Ministry of Environment and Tourism, Directorate of Forestry, Namibia. Cited by Kojwang H. O. 2000.

Subsistence economy is bound to remain a major component in Namibia's development. Because of a high population growth annual rate, the demand for firewood in rural areas, and in the northern urban areas will increase a good deal and remain directly related to the size and growth rate of the rural economy (Rep. of Namibia, 2000). In the more industrialised towns consumption trends will tend to increase mostly as a result of rural-to-urban immigration of low-income people. Indeed higher income people will in all probability resort to alternative forms of energy such as gas for which the recent discovery of vast deposits in Southern Namibia could have a direct impact.

The projected consumption of firewood in Namibia from 1996 estimates give, for 2006, the following figures: 315 806 tons for urban areas; 553 194 tons in rural areas; and 202 500 tons for other. It seems that, within the foreseeable future, fuel-wood will remain the main source of domestic energy.

Table 12: Total firewood consumption in Namibia (1996 estimates)

Firewood Market	Commercial		Subsistence	
	Volumes *	Values **	Volumes *	Values **
Windhoek	34 992	17 469 000	3 168	1 545 000
Ondangwa, Oshakati, Ongwediva	11 023	4 299 000	4 144	1 616 000
Rundu	8 149	1 059 000	4 155	541 000
Other Towns	62 000	11 000 000	48 000	9 000 000
Rural	-	-	460 000	55 200 000
Export	700	305 000	-	-
Charcoal	35 000	1 750 000	-	-
Other Uses	1 000	270 000	-	-
Total	152 864	36 197 000	519 467	67 702 000

Source: Adapted from Kojwang, 2000 b. * Volumes in tons. ** Values in N \$

2.4.5 Charcoal

Namibians use less charcoal for domestic energy needs than many other Africans. The mining industry used to consume around 24 000 tons of charcoal/year but has switched to coal lately. The Acacia dominated commercial livestock farms in the Otjiwarongo, Grootfontein, Outjo and Gobabis districts provide most of the wood harvested for charcoal. The manufacturing or

carbonisation process is done in mobile kilns that give a recovery or conversion rate of 20 %. There have been attempts to improve this recovery rate through the use of retort kilns that also yield others useful by-products.

Namibia is among the most organised countries in Southern Africa in terms of regional and international trade of commercial charcoal. In 1997, some 100 charcoal producers employed 2000 small entrepreneurs that earned on average N\$ 430,00/month from burning charcoal. These producers earn a net profit of N\$ 217,00 per ton while the profits for the marketing agents, is N\$ 210,00 per ton. The Namibian charcoal industry produces about 12 000 tons of charcoal, which are mainly exported to Germany (5 000 T), the U.K. (2 500 T), South Africa (3 000-4 000 T). The balance is consumed locally.

The main domestic consumers of charcoal are urban households and the hospitality industry. The total consumption (12 000) is quite small compared to the total annual production. The domestic consumption trend will be related to the rate of recruitment of low-income households (who are the main users of charcoal) into middle and upper income groups. Projected estimates forecast that by 2006, Namibia will be consuming 10 000 tons of charcoal internally; 3 000 tons in the barbecue market and 7 000 tons in domestic cooking (Rep. Namibia, 2000).

2.4.6 Non-wood forest products

Non-wood forest products (NWFPs) or non-timber forest products (NTFPs) are the most common terms describing a range of forest resources other than wood or timber. In Namibia, they generally refer to goods of biological origin other than wood, derived from forests and allied land uses. NTFPs exclude those products derived from domesticated plants.

Categories and roles of NWFPs

NWFPs fall into two broad groups, namely commodities and services:

- **Commodities:** This group is further subdivided into 3 categories, based on the nature, kind and use of products from plant, animal or mineral origin. NWFPs originating from plants belong to 3 major groups, namely: food commodities, medicinal extracts and leaves for weaving and decorating;
- **Services:** They comprise tourism, recreation, and wildlife watching, among others.

NWFPs play an important role in day-to-day life for many rural communities in Namibia. They have recently received considerable interest from various stakeholders, due to their economic and nutrition values. NTFPs are now globally recognised for their contribution to improved rural livelihood by providing food, nutrition and medicine, and by generating employment, revenues and foreign exchange earnings. The numerous NWFPs traded in informal as well as in formal markets include fruits and their by-products (wines, liqueurs, nuts and oil), Mopane worms, and grass, etc. NWFPs such as marula oils for food and cosmetic and devil's claw for medicine have gained access to the international market arena.

Plants for food

Namibian forest plant foods include fruits, wild leaves, seeds and nuts, roots and tubers, melons, gum and resin-extracts, mushrooms and other related fungi. For instance, the San

people know and use as many as 150 edible plant species that represent significant components of their diet (Erkkilä & Siiskonen, 1992).

The most important fruit trees in Namibia are *Sclerocarya birrea* subsp. *caffra*, *Berchemia discolor*, *Diospyros mespiliformis* and *Hyphaene petersiana*. Other significant ones are *Schinsiohyton rautanenii*, *Strychnos cocculoides*, *S. spinosa*, *Adansonia digitata*, and *Acanthosicyos horridus*.

The leaves, seeds and nuts from a number of forest-plant species are consumed fresh or cooked with staple grain dishes. Hence, they improve the nutritional quality of diets by adding proteins and minerals. The Nara plant (*Acanthosicyos horridus*), a cucurbit plant endemic to the Namib Desert, is also an important source of food and water for the San community along the rivers on the coast. Likewise, a number of climbers have edible roots and/or tubers. There are also a few tree species that produce edible gums (*Combretum imberbe*, *Acacia senegal* and *Terminalia cericea*) and a variety of mushrooms and other related fungi such as Termite hill mushrooms (species of *Termitomyces*).

Medicinal plants

Most Namibians use medicinal plants, especially in rural areas where modern medical facilities are not always available and/or affordable. In the Otjozondjupa region, more than 80 therapeutic plant species are known to cure around 30 medical ailments. Efforts under the Biodiversity Programme at the MET are developed to formalise collaboration between traditional healers and modern medical scientists.

The best known medicinal plant in Namibia is Devil's Claw (*Harpagophytum procumbens*), a perennial plant of the Pedaliaceae family. Its secondary roots are used exclusively to treat degenerative rheumatic disorders. They contain relatively high concentrations of irid glycosides and harpagosides.

In 1998, the export of dried root materials of Devil's Claw brought up N\$ 8-11 millions. In order to insure sustainable harvest levels of this plant, an NGO (CRIA SA-DC) has developed proper methods of collection and management of the plant. The NGO is heavily involved in the commercialisation of the product on European market places.

NWFPs of wild animal origin

This category of NWFPs includes game meat, fresh water fish, and insects:

- Game or bush meat provided most of the Namibians' protein needs until the establishment of the National Parks and the issuing of the Nature Conservation Act of 1974 that protects wildlife. With the recent development of Conservancy, rural communities have a right to manage and utilize the game (especially small antelope) in their vicinity;
- Fresh Fish in river habitats plays a significant role in the daily diet of people living near or along watercourses. In the Caprivi region, people catch fresh fish throughout the year for their subsistence as well as for income generation. The potential for expanding Namibia's freshwater fishing industry is considerable and farmers in these areas need to be supported by developing proper freezing facilities;

- Insects such as caterpillars, termites and bees constitute another food of animal origin. Mopane worms developing on *Collophospermum mopane* are renowned for their delicacy. Other caterpillars growing on *Burkea africana* and *Terminalia sericea* are locally consumed, playing thereby a major role in local people's diets. Termites are also appreciated during the rainy season in many parts of Owambo. However, there is no indication of their trading on local market places;
- Bee-keeping: Unlike most other parts of Namibia, where long-lasting dry climate and severe water shortages prevail, bee keeping is a promising deal in northern Namibia. The most preferred trees for apiculture are *Berchemia discolor*, *Adansonia digitata* (Baobab) and the exotic *Eucalyptus spp.*

Eco-tourism

Namibia's potential for eco-tourism is huge, because the country has diverse and often unique environments that attract nature lovers. However, the distinction between eco-tourism and «ordinary» tourism is not easy to make. Namibians define tourists as those visitors entering the country with the intention to stay at least one night and not more than one year. In 1998, over 500 000 tourists visited Namibia, and since then, the number of visitors growth rate has been over 20 %.

2.4.7 Economic and social contribution of Forestry

Social and economic contribution

Namibia's forest sector is evaluated on the basis of its commercial timber industry alone, excluding all other values. Its economic contribution is therefore not fully reflected in the calculation of the GDP. Indeed, despite the absence of a formal industrial plantation-base and of rich commercially exploited natural forests, the forest sector contributes over 1 billion N \$ through fuel-wood, arts and crafts, construction wood, NWFPs, as well as ecosystem amenities sustaining wildlife-based tourism and environmental conservation (Kojwang, 2000 a). Namibia's woodlands also provide browse and grazing for livestock farming and are vital to the tourism industry because they constitute valuable habitats for game animals

The forestry sector's social input lies in its fuel-wood and NWFPs contribution, which are the main origin of domestic energy for the majority of people, and an important source of food security and income generation. It is necessary to establish comprehensive databases on the forestry sector's factual contribution to the national economy in order to put the forestry sector's role into better perspective. This exercise requires assistance of international development partners.

Contribution to employment and revenues

Arts and crafts, NWFPs and eco-tourism activities are the most important providers in terms of job creation and income generation. Unfortunately, there is no available information concerning their relative contributions to employment and revenue generation.

2.5 Status of forest industries

2.5.1 Present state of the forest products industries

It is estimated that 88 forest-based industries are engaged in wood products' trade and utilisation. These companies are mainly involved in the manufacture of wood and cork products, in the sawmill industry, the furniture and fixtures businesses and in manufacturing paper and pulp products (pulp, paperboard).

Namibia's forests are in deficit of raw materials to economically sustain wood industries. Therefore raw materials used in the country's forest industries are mainly imported from neighbouring countries. While no flourishing sawmill or pulp and paper industry exists in Namibia, recent efforts to develop cottage industry on wooden crafts derived from dead or dry wood have produced promising results in the Tsumkwe region. It is believed that improved results could be obtained from such industries, with additional training of artisans and a reliable supply power source (Kojwang, 2000 a).

Considering the actual potential of Namibia's currently under-utilised commercial tree species¹¹, providing mobile saw milling and processing equipment would undoubtedly foster the development of high value furniture businesses, of specialised wooden implements and crafts and even of potentially lucrative parquet flooring industries. There are also prospects to develop, using new and improved saw milling and reconstituted wood products' manufacturing technology, small scale profitable wood industries based on species such as *Acacia mellifera* to assemble chipboards and wafer boards.

The country's vision is to obtain by the year 2005, a formal industry of wood and non-wood products such as crafts, industrial oils, and indigenous fruits and juices that would contribute more significantly to the national economy.

2.5.2 State of supply and demand of forest product

Now and for the foreseeable future, all of the demands for biomass energy, arts and crafts, and traditional fencing wood are met by local production. On the contrary, all the industrial timber, paper, and panels will continue to be met through imports from neighbouring countries, especially from South Africa.

The current annual consumption of about 1,2 million tons of fuel-wood is bound to decrease as the country's GDP improves and the prospect for alternative energy sources gets better. In fact, the recent discovery of an important natural gas in southern Namibia and the planned construction of a hydroelectric power project on the Kunene River in the Northwest should increase the availability of cheaper power. This would reduce the degree of dependence on woody biomass energy.

¹¹ *Burkea africana*, *Giurbourtia coleosperma*, *Colophospermum mopane*.

2.6 Environmental values of forests

Forests and woodlands have also a spiritual role in some areas, as sanctuaries for traditional worshippers. They also participate in enhancing scenic beauty of rural landscapes, in mitigating climate and in regulating air pollution in urban centres. The last two functions of forests are specifically recognised in Namibia's Forest Policy.

Biodiversity conservation

By providing habitats for many plant and animal species, forests under sound management contribute to the conservation of the country's rich biological diversity. This explains the DoF's key membership in the National Biological Diversity Task Force. The latter includes all the institutions in charge of parks, wildlife, environmental affairs, and the National Botanical Research Institute, each of whom has a Biological Plan of Action in its national programme.

Soil and water protection

Namibian forest ecosystems have important protection functions. They protect watersheds as well as watercourses, whether ephemeral or perennial and contribute significantly in maintaining water quality and quantity. The forests and woodlands of Namibia contribute to desertification control by preventing soil losses resulting from wind and/or water erosion.

3. The Forestry Sector

3.1 Institutional Framework of Forestry

3.1.1 State institutions in charge of the Forestry

The Ministry of Environment and Tourism (MET) is the umbrella ministry responsible for forestry in Namibia; it is composed of four Directorates, respectively of Environmental Affairs, Parks and Wildlife Management, Tourism and Forestry.

Directorate of Forestry

The Directorate of Forestry (DoF) is in charge of the 'forestry sector' in Namibia. It was established in 1990 with the help of partners. It has set up most of the instruments needed to develop sustainable forestry activities in the country. It faces, however, many challenges in terms of human resources, infrastructure development, and logistics.

The DoF is responsible for developing and implementing appropriate policies, legislation and strategies in order to achieve the sustainable management of all types of forests and woodlands. Its missions also include resource monitoring and assessment, research, control over utilisation, processing and trade, and conservation for national and global benefit.

In 1996 the DoF elaborated the National Forestry Strategic Plan, the major instrument used for policy implementation. It has also adopted an operational planning system, which develops mid-term strategic objectives and defines, on annual basis, major areas of results and

sets targets that are used to manage the performance of individual staff, starting from the Director to District Forest Officers. It also has developed a Management Information System consisting of six priority systems dealing with forest permits (3), management reporting, forest inventory, and human resource development.

Through the Community Level Management of Natural Forests and Environmental Forestry Programmes, the DoF shall contribute to biological diversity conservation by establishing community-based forest reserves. It will also create key forest types that are not currently part of the nationally recognised protected area network. The targeted goal is to increase the combined size of protected areas from the present 8% to about 10% of the total land area.

Other institutions

Other institutions dealing indirectly with forestry include the National Botanical Research Institute (herbarium), the Directorate of Environmental Affairs - Environmental Impact Assessments, the Ministry of Trade and Industry (MTI) - forest products' import and exports, and various NGOs such as CRIAA, DRFN, DAPP etc.

3.1.2 The private sector and forestry

The DoF has engaged in efforts to promote a greater investment participation of the private sector in value-added industries, contributing thereby in strengthening the forestry sector and modernizing its economy. The forest administration works in partnership with the MTI to promote investment by enhancing the role of the private sector in commercialising products from small-scale industries based on domesticated and wild indigenous fruits.

The Namibian NDP II emphasises policy incentives that include; (i) public ownership and operation, (ii) public regulation of the use of private forests, (iii) public stimulation, guidance and assistance to private forest management and (iv) promotion of the private implementation of forest policies

3.1.3 Forestry research

Responsible for forestry research, the DoF is seconded in its task by the National Botanical Research Institute (NBRI), the Desert Research Foundation of Namibia (DRFN), and the Department of Agriculture of Polytechnic of Namibia.

The Research Division of the DoF has insufficient skilled, well-trained and experienced scientific and technical personnel. It has limited available information pertaining to past research actions carried out throughout the German occupancy and during the South African Mandate Period. Despite this, the division has achieved much by creating and commissioning a national research and tree seed centre in 1997. These two facilities were constructed at Okahandja, with offices also created in Otjiwarongo, Gobabis, Keetmanshoop and Opuwo.

The Research Division is currently working on projects related to Mopane woodland management and to Marula provenance trials. In addition, it is expecting funding to initiate planned research activities related to selection and genetic improvement of selected indigenous fruit trees, and to long term monitoring of forests using permanent sample plots.

3.1.4 Forestry training

The DoF has made noticeable efforts in human resource development by funding training for its staff members at MSc and BSc levels, in addition to the diploma or technician level training. Six staff members have so far successfully completed their MSc programme. They are currently working at the DoF. By 2005, the DoF plans to fill 70% of all professional posts and 100% of all technical posts with well-trained Namibians.

3.2 Forestry policy, strategy and legal framework

The Directorate of Forestry is the sole administration responsible for forest policy and development planning.

3.2.1 Forest policy framework

The weakness of forest policies through the colonial and liberation struggle periods prevented meaningful forestry development prior to independence in 1990. This was so in large areas of Namibia, particularly in the northern areas where forest resources are naturally available.

The first National Policy for Namibia was introduced in 1992, and then reviewed in 1998 to conform to the major development objectives outlined in the National Development Plans I and II, and to be in line with the global policies of the 1992 UNCED held in Rio de Janeiro. A revised Development Forestry Policy for Namibia was approved in November 2001. Thus, with the 1996 National Forestry Strategic Plan for Namibia, which was formulated through a participatory process based on a thorough sector review, the necessary policy, strategic and institutional framework is in place for a National Forest Programme.

Forest policy and rural development strategy

Namibia's forest policy is formulated in line with the attainment of the rural development strategy's common goals, which puts emphasis on poverty alleviation measures, designed to relieve pressure on the environment. The goals of this national strategy include:

- Intensification of agricultural production (crop and livestock) through innovative land-use strategies that hold the possibilities of increasing farm productivity and incomes;
- Development of small and medium manufacturing enterprises based on wood and non-wood forest raw materials;
- Conservation of wildlife habitats as a base service for development of the tourism industry;
- Development of a sustainable rural economy that the country can support indefinitely.

Forest policy and poverty reduction strategy

The four basic aims of the forest policy flowing directly from the poverty reduction strategy are to:

- Reconcile rural development with biodiversity conservation by empowering farmers and local communities to manage forest resources on a sustainable basis;
- Increase the benefits derived from the national woodlands' growing stock, through research and development, silvicultural treatment, protection, and promotion of requisite economic support projects;
- Create favourable conditions to attract investment in small and medium industry based on wood and non-wood forest raw materials;
- Implement innovative land-use strategies including multiple use conservation areas, protected areas, agroforestry and a variety of other approaches designed to yield forestry global benefits.

Revised forest policy objectives

The objectives aim to:

- Maintain environmental stability and where necessary, restore ecological balance of adversely disturbed sites through forestry;
- Conserve the national heritage of forest types through a network of protected representative forests and other wooded ecosystems;
- Integrate forestry planning into regular national, and local land use plans and farming systems;
- Increase the wooded area and improve the quantity and quality of wood and non-wood resources, and oversee their sustainable utilization;
- Meet the local demands for fuel wood, domestic construction and fencing materials;
- Develop and publicize professional knowledge in forests through research;
- (Promote and regulate the processing and trade of wood and non wood products at both the local and international levels;
- Facilitate community participation and particularly women, in forest management, in order to generate income and enhance food security.

3.2.2 Forest strategy and legal frameworks

Forestry strategic plan

The 1996 Forestry Strategic Plan (FSP) is the first comprehensive post-independence such document elaborated in Namibia (MET, 2000 c). It is a valuable complement to the 1992 Forest Policy and the major instrument for its implementation. Also it is presently the basis of donor support to the sector.

The FSP has four programme areas namely, Institutional Capacity Building, Community Level Management of Natural Forests, Farm Forestry and Environmental Forestry. The Forestry Strategic Plan's goals are to:

- Contribute towards meeting the needs of the rural poor through the provision of basic needs in firewood, poles, posts and food and the generation of rural incomes, stimulation of the growth of productive off-farm activities in the rural areas;
- Maintain the protective functions of forests with respect to soil, water and biodiversity vital to the welfare of the present and future generations;
- Strengthen forestry institutions to improve their competence.

Legal framework: the New Forest Act

The New Forest Act, signed by the President on 6th December 2001, recognizes under Part II dealing with forest management issues, the need to plant trees where necessary in Namibia in order to conserve and protect soil and water, and to enhance the natural environment (Rep. of Namibia, 2001). This Forest Act (promulgated in 2002) aims to:

- Provide for the establishment of a Forestry Council and the appointment of certain officials;
- Consolidate the laws relating to the management and use of forests and forest produce;
- Provide for the protection of the environment and the control and management of forest fires;
- Repeal the Preservation of Bees and Honey Proclamation, 1923¹², Preservation of Trees and Forests Ordinance, 1952¹³ and the Forest Act, 1968¹⁴;
- Deal with incidental matters.

3.2.3 Forest Planning and coordination mechanisms

Central planning

The National Planning Commission is the main institution responsible for planning national development. The recently developed National Development Plan II of Namibia 2000-2005 has taken into account the development of the forestry sector by including the strategic objectives outlined by the Directorate of Forestry.

Decentralized planning

The Government has elaborated the following three major policy changes towards decentralization, that should correct the centralist model of natural resources' administration (Kojwang, 2000 a), particularly for forest resources:

- Communal land bill: This new bill, which provides for regional land boards and land use plans, grants rural associations the right to seek investment credit by using a communal title as collateral;
- The Forest and Wildlife Law allows local institutions to manage community forest reserves and wildlife conservancies and grants resource tenure or usufruct rights on

¹² Proclamation No. 1 of 1923

¹³ Ordinance No. 37 of 1952

¹⁴ Act No. 72 of 1969

the basis of agreed upon arrangements with the central or regional or local governments;

- Decentralisation policy: the Ministry of Regional Local Government and Housing implements the decentralization policy.

The above measures should contribute to speed up the decentralization process within the forestry and other natural resources sectors, by empowering regional and local governments to be fully in control of planning and decision-making, management of resources and revenues of forest localities. The Central Government will still be in charge of:

- Policy formulation;
- Supervision of policy implementation;
- Law enforcement;
- Forestry development planning coordination at national level.

Cross-sectoral coordination

It is needed to ensure successful implementation of forestry programmes, especially with the following institutions:

- The Ministry of Finance: Determines the financial resources allocated to the DoF for implementation of public forestry programmes;
- The National Planning Commission: Responsible for the preparation of development budgets and coordination of the international community support towards national development efforts;
- The Ministry of Agriculture, Water and Rural Development: Executes specific programmes that have agroforestry components, and it has an extension training service;
- The Ministry of Lands, Resettlements and Rehabilitation: Responsible for the implementation of the proposed Land Use and Environment Board, Land Boards and Land tenure.

3.3 External support and International commitments

3.3.1 External support to forestry

A number of partners assist Namibia through international, multilateral or bilateral support. This helps in efforts to conserve and manage sustainably its forest resources:

At the international multilateral level, FAO, USAID, SIDA, CCD Secretariat and the World Bank provide financial assistance to Namibia's National Programme to Combat Desertification. At the bilateral level, the following governments provide this assistance as indicated below.

The Finnish Government

It supports, through the Namibia-Finland Forestry Programme (NFFP) DoF's current efforts to strengthen its human resource capacity in order to develop sound forest management practices.

The Government of Germany

It assists Namibia, through the NGO German Development Service - GDS/DED and SADC/GTZ, and via two "Community Forestry Projects", which seek to support local communities in the preservation and sustainable use of the natural forests, by empowering them to secure their forests against illegal exploitation, so that they may enjoy the derived benefits in a sustained way.

The Danish Government

Through Community Forestry and Extension Development, Denmark aims to address unsustainable land management practices in Namibia, by placing the emphasis on interactions of people and their livestock with the natural environment.

3.3.2 Commitment to International conventions and treaties

Even though Namibia only joined the United Nations as an independent state in 1990, it has already joined the international community in its effort towards safeguarding the Earth's biological diversity by signing the:

- The CITES, a key convention on Control of Trade in Endangered Species was joined in 1991 by Namibia. The June 1997 CITES Conference in Harare Zimbabwe gave rise to much concern and debate over the proposed sale of ivory stocks by Namibia, Botswana and Zimbabwe in 1991;
- The Convention on Climate Change and the Convention on Biological Diversity, both in 1992, at the Earth Summit, in Rio. The CBD was ratified in March 1997;
- The Convention for the Protection of the Ozone Layer in 1993;
- The Ramsar Convention on wetlands of international importance in 1995;
- The Convention to Combat Desertification ratified in 1997.

The country has lived up to its commitments and has published a National Biodiversity Strategy that describes the country's goals, objectives, and targets for a sustainable conservation/management of its ecosystems (MET/DEA, 2001). The Basel Convention on the trans-boundary movement and disposal of toxic wastes is yet another treaty to which Namibia is presently considering accession.

3.4 Progress achieved in implementing IPF proposals of action

A meeting of LFCCs was held in Tehran in October 1999 to review progress and identify issues, constraints and achievements in implementing the IPF action proposals. Namibia has carried out the following with respect to the forestry sector:

Strengthening forest resource collection and information systems

The DoF has conducted a number of forest resource inventories and has also developed Management Information Systems for forest permits and reporting. This has been done through the Namibia Finland Management Programme (NFFP).

Development of criteria and indicators for sustainable forest management

The consultative process initiated in October 1999 by the DoF (through the NFFP) resulted in the production of a document called “Criteria and Indicators for Sustainable Forest Management in Namibia”. This should help the DoF to periodically assess the performance of the sector and benefit from a solid basis for developing National Programmes to enable the systematic implementation of IFF/IPF action proposals.

Review of policy, legal and institutional frameworks

In 1996 a Forestry Strategic Plan was adopted that provides a framework for programming forestry sector development. This plan identified priority development programs as capacity building, community forestry, environmental forestry and farm forestry.

A new National Forestry Development Policy was formulated in 1998 to (i) integrate the increasing concern about the loss of Namibia’s natural resources, (ii) the need to involve stakeholders in the decision making and management process related to forest management; and (iii) to consider the fact that many decisions affecting forest resources stem from outside the forest sector.

A New Forest Act was passed by Parliament which provided a legal framework for community participation and for the promotion of sustainable forest management in forestry development.

Forest fires

Given the gravity of the forest fire situation in Namibia, the Government is working on a memorandum of understanding dealing with cross border fires with neighbouring Angola, Zambia and Botswana. In addition the DoF (responsible agency in forest fire issues), is developing a National Forest/Veld Fire Management Policy that stipulates the responsibilities of different stakeholders. This is with the support of the Government of Finland.

3.5 Country vision

Forestry’s national objectives

The four long-term national objectives that guide Namibia’s forestry sector development planning are:

- Reviving and sustaining economic growth;

- Creating employment opportunities;
- Alleviating poverty;
- Reducing income inequalities.

Forestry strategic plan

The 1996 Forestry Strategic Plan specifies forestry objectives and strategies that aim at efficient programming within the integrated national development framework. The priority forest development programmes are:

- Capacity building;
- Community forestry;
- Environmental forestry; and
- Farm forestry.

Farm forestry

There is a strong focus on farm forestry because collective land areas have endured significant forest cover losses. The areas are central to a tightly farmed landscape resulting from a steady rise in human pressure.

The most promising prospect for better community involvement in forestry lies in the establishment and maintenance of tree resources on farms. It is hoped that farm forestry will alleviate the shortage of basic forest products' needs, particularly, firewood and fence posts. In addition, it would contribute to reversing the declining trend in agricultural productivity by conserving soil fertility, and decreasing erosion.

It is noteworthy that despite Namibia's aridity, there is increasing political support for afforestation and a clear option to achieve more than 10 000 hectares of plantations and woodlots by the year 2020. This could provide most of the construction poles and fencing materials and some indigenous fruits.

Combating desertification

In 1994, Namibia's Government initiated a National Programme to Combat Desertification (NAPCOD), and, three years later ratified the Convention to Combat Desertification in 1997. NAPCOD aims to combat the process of desertification by promoting the sustainable and equitable development of natural resources suited to Namibia's variable environment for the benefit of Namibians, both present and future. The main objectives of this programme are to:

- Establish mechanisms for information collection and analysis regarding desertification issues in Namibia;
- Identify key players and establish and improve their capacity;
- Develop integrated planning strategies at all levels on the basis of clearly defined policies;
- Implement appropriate interdisciplinary research programmes;
- Provide appropriate training and education according to needs at all levels; and

- Empower natural resource users and managers to plan and implement sustainable management practices.

NAPCOD is co-ordinated by the DEA, and its steering committee consists of representatives from the MET, MAWRD, MLRGH, NANGOF, DRFN, NNFU, NAU, NDT NEPRU and UNAM.

National capacity

The DoF's main weakness lies in its severe shortage in qualified forestry staff. Indeed, out of the 123 professional and technical staff positions, only 65 of them are filled (representing 52,8% of the total) and 57 remain vacant. Efforts are ongoing to solve this issue as the DoF is developing its human resource capacity by training several forestry staff members to Forestry Diploma level and BSc. degree. Following this, it should be able to deal with data collection, compilation, analysis and dissemination. It is particularly essential to increase the human resource capacity in the area of forest research, to manage and perform scientific research and produce data and information relevant to support the various forest management activities

4. Causes/effects of deforestation and forest degradation

Deforestation and forest degradation contribute actively to desertification, which is defined as "land degradation occurring in arid, semi-arid and dry sub-humid areas, in response to various factors, including climatic variations and human activities¹⁵ resulting from rapid population growth" In Namibia it also consists of bush encroachment, which is an invasion of rangelands by thorny woody vegetation that impedes grass growth. This rather peculiar perception of the desertification concept is a very controversial issue in Namibia, which has triggered heated debates among biologists.

4.1 Indirect causes

4.1.1 Land tenure and user rights

In Namibia, about 6 500 freehold commercial farming holdings (averaging 5 800 hectares each occupy around 45% of the land, namely in the Central Plateau Region. The majority of the remaining Namibian population (60 to 70 %) lives on 25 % of the country's land area, in communal lands situated in the North (Kojwang, 2000 a).

This large human concentration within a small portion of the national territory has put a huge pressure on natural resources, particularly in forested areas where:

- Lands have been cleared for homestead and farm establishment;
- Excessive wood harvesting to satisfy rural domestic needs (cooking, construction, heating, and lighting) and urban demands (building, fuel, carvings) has taken place;

¹⁵ Deforestation, overgrazing, inadequate agricultural practices leading to soil erosion and deterioration

- Frequent bush fires have taken their toll on a regular basis;
- To a lesser extent, overstocking has resulted in overgrazing.

Land redistribution in Namibia is an important issue with strong racial connotations. It calls for the promotion of a land redistribution reform that makes agricultural development more profitable. This will necessitate a new land use legislation that brings an end to the still on-going principle of “willing seller-willing buyer”, which rests on the right of property.

4.1.2 Water tenure

Namibia is a land of severe and long-lasting water shortages in many parts of its territory, but there is no documented information linking scarcity of water in Namibia to deforestation and land degradation.

4.1.3 Incentives, constraints in agricultural production

Agricultural production has mainly taken place on the communal areas with very little irrigation along the northern rivers. It is surprising to note that in terms of investments, so far very little has been done to promote arid land agriculture in parts of Namibia. The main constraints for this lack of investment can be attributed to the scarcity of fresh water and the prohibitive costs associated with the exploitation of saline fossil ground water sources. Therefore, strictly speaking, incentives in arid land agriculture do not constitute an important cause of deforestation or forest degradation.

However, the recent land bill that promotes the use of communal title deeds as collateral for joint credit loans could foster agricultural development projects (horticulture, livestock production etc.) in northern Namibia (Kojwang, 2000 a) and affect woodland and savannah vegetation types.

4.1.4 Poverty

The issues of poverty and food security are the driving forces of many activities leading to the unrestrained use of natural woody formations and subsequently to deforestation and land degradation. However, the major recognised cause of deforestation in Namibia is clearing of woodlands for agriculture and/or for human settlements, and these two are closely related to poverty and food security issues.

The Namibian Government is engaged in promoting policy environments that reach out to the people in rural areas and has taken steps towards solving this crucial human aspect of the environment.

Unchecked population growth vs. limited forest resource base

Satisfying the growing needs of a fast growing population has led to shortages of fuel-wood and building materials, as well as to soil erosion and land degradation problems in several parts of the country, especially in the more heavily populated northern regions. Many areas

once covered by forests and woodlands have been rapidly deforested over the last few decades due, in part, to wood harvesting to satisfy human needs.

Economic situation and consumption patterns

The majority of Namibians live in rural areas where they develop survival instincts and rely heavily on wood and non-timber forest products to survive economic hardships.

4.2 Direct causes

Direct causes of deforestation and forest degradation in Namibia include natural causes and the ones related to human activities.

4.2.1 Natural causes

It is very difficult to identify natural causes to deforestation and land degradation in Namibia, characterised by an arid climate exacerbated by low and erratic rainfall. The inter-annual variations in rainfall may lead to the decline of some vegetative cover in the most vulnerable environments in the case of prolonged drought periods.

4.2.2 Causes linked to human activity

Man-made catastrophes

Fire is one of the major factors contributing to the destruction of Namibia's woody vegetation. Vast areas are affected yearly by uncontrolled forest/veld fire. In 2001, about 5 million ha have been burned in the country with 2/3 of this area situated in the Caprivi, Kavango, Otjozondjupa and Omaheke regions.

Misuse of natural resources

Mismanagement of natural resources in Namibia is a major factor of deforestation and land degradation. The now common prolonged concentration of large numbers of people and livestock in forests and rangelands, has led to overgrazing, deforestation and land degradation. This is particularly true of northern Namibia, where woodland resources are exploited well above their regenerative capability and rangelands are used beyond their carrying capacity.

Agricultural land abandonment

Land abandonment in Namibia is not common because of the very limited arable land areas in the country. However, inadequate agricultural practices can lead to extreme depletion of land fertility, and the subsequent temporary abandonment of cropping areas. In some circumstances this will lead to the loss of woody vegetative cover through its conversion to agricultural fields.

Infrastructure construction

The construction of dams to generate hydroelectric power has resulted in the destruction of vegetation on dam sites and flooding of dam reservoir areas.

The unregulated creation of artificial water points on all the commercial farms in Namibia lowers the groundwater tables in many parts of the country and contributes to the decline of some forest resources.

Finally, the building of new housing facilities around big cities claims lands previously colonized by woodlands.

4.3 *Effects of deforestation and forest degradation*

The main effects of deforestation and forest degradation are the steady loss of productive land, the exhaustion of NWFPs along with the reduction of incomes they generated, all of which accentuate or create poverty, promoting further desertification. This seemingly cyclical expression of desertification has raised awareness of the necessity to give more consideration to the poverty alleviation issue and to the implication of all stakeholders, especially local grassroots populations in the combat against deforestation and forest degradation.

Extent of deforestation

To-date no comprehensive study has been carried out to determine specifically the extent of deforestation in Namibia. Therefore there is no official national figure on the rate of deforestation or the underlying complex driving forces.

The only assessment carried out concerned the Ohangwena Region in northern Namibia. Using satellite imagery and aerial photographs, the forest cover change was evaluated showing a decrease in forest area between 1981 and 1992. An annual forest area reduction rate of 0,5% (Erkkilä and Löfman, 1999) was observed, which applies more specifically to tree savannahs and woodlands. Given an estimated total area of 22 823 387 ha of forests and savannahs in northern Namibia and the above rate of deforestation, one could establish that about 100 000 ha are lost annually in that part of the country. This may be an oversimplification. This reduction of the resource base is concurrently tied with a loss of species diversity, a decline in range biomass, and an increase of associated erosion problems. Furthermore, the decline of the resource base affects population groups by triggering more poverty.

5. Status of Knowledge

5.1 *Lessons learned*

Namibia can look back on a decade of new interventions and of testing various approaches to community-based natural resource management, rural development, SME promotion, conservation and sustainable use of biodiversity, all ultimately adding up to the struggle against deforestation and desertification.

The major lesson learned is that these issues relate ultimately to livelihood security and poverty alleviation. As a response to this state of affairs, the human dimension is gradually becoming central to the sustainable management of forests and woodlands. The priorities of the Namibian Government include henceforth:

- The development and refinement of people-centred approaches and methodologies;
- The development of well-targeted training and information materials;
- The creation of true opportunities at the grass-roots level;
- The facilitation of communication and information exchange;
- The strengthening of the collaboration and support amongst all stakeholders;
- The elaboration of policy environments that reach out to the people in rural areas.

Lessons learned through the implementation of various environmental conventions and related programmes help direct future interventions and are shared throughout the SADC region.

5.2 Gaps in knowledge

Due to the recent accession to independence and despite all the efforts of the DoF, there are many pending issues that need to be investigated, which include:

- Assessing the extent and consequences of deforestation, land degradation and desertification;
- Capturing traditional knowledge, experience and technical and managerial skills;
- Elaborating new approaches to promote full participation/partnership in rural communities' development;
- Establishing networks of decentralized statistical planning databases;
- Developing communication support for awareness rising about environmental degradation and desertification.

6. Conclusions

6.1 Forestry focus

Resource conservation and development

Namibian forestry is mainly focused on conservation of existing forest resources and other woody vegetation through sustainable management practices. Non-wood Forest Products play a major role in the lives of the majority of rural Namibians. Therefore these need systematic development for sustainable use locally. Furthermore some products like Marula and Devils Claw have international markets and therefore need proper management to benefit the local people.

Even though the area under forests will decrease, better land use planning at the regional and local levels will produce a legally recognized forest state which will be more immune to unplanned conversions to non-forest uses as is the case today. In other words, forest reserves of various classes will be part of the protected area network in Namibia.

Forest industries: innovation and investment

In the absence of a strong traditional forest industry, Namibia should creatively exploit its available resources by adopting existing new technologies for processing of its wood and non-wood products. The area of reconstituted wood products, the utilization of lesser-known tree species, the development of new products from non-wood raw materials, all warrant serious attention. There is room for development of cottage industries based on limited local resources.

In order to achieve these alternative options, the government will have to pursue a policy of attracting private sector investment in product processing and also convince donors to be more actively involved initially in value-added industries.

6.2 Assets and potentials

Exotic species' potential for future plantations

At present there are few woodlots of exotic species in the country, which indicate that there is some potential for further development in this area. Some exotic species, such as *Prosopis*, (undesired in some circles), grow very well in some parts of Namibia where there are no trees at all and as a result provide shade, fodder and firewood.

Creative value-added prospects

Namibia has unique forest resources, which have significant potential value in economic and environmental terms. There are many opportunities for the Namibian forest sector to develop in its unique ways, not by large industrial plantations, but by more creative investments in processing and taking advantage of new niche-market specialized products and also of the growing tourism industry as a market for value-added products.

Policies

The adoption of revised policies in the forest sector means that the sector will be sensitive and also contribute to the conservation of biological diversity, and the mitigation of climate change. As well it will be regularly assessed using the concept of criteria and indicators for sustainable forest management.

Over the past decade the main trend has consisted of working with local as well as national plans, projects and initiatives to induce the implementation of activities conducive to a better appreciation of land degradation and desertification control. This concept is basic to the implementation of environmental conventions ratified by Namibia and coordinated by a "Conventions Synergy Committee", through the National Biodiversity Programme.

6.3 Issues

Forest plantations

At present the dry environment limits the development of large-scale forest plantations. Low precipitation and unsuitable soils hinder the establishment of fast-growing indigenous species.

Decentralization

Namibia has quite supportive policies and legislation in forestry and wildlife, in view of current global policies and conventions but would gain from more efficient, partly decentralized administrations.

Capacity building

The sector's limited capacities and capabilities constitute a major constraint in view of the diversity of issues to be resolved and the dimension and distribution of the forest estate.

7. Recommendations

7.1 *Development choices and issues*

Forestry sector contribution to national economy

It is of the utmost importance to evaluate the actual contribution of the forestry sector to the national economy, and therefore we recommend to:

- Assess the value of revenues raised by the forestry sector to determine its financial contribution to the national economy;
- Take into account and analyse revenues from the wildlife sector since forests and other woody vegetation provide important habitat to game.

Food security

In attempting to achieve national food security it is important to consider that the forestry sector has much to offer to complement agriculture in providing food commodities. It is therefore recommended to:

- Support the current policies to improve food security and diversify rural incomes through careful assessment of natural resource availability and the issues of their sustainable use;
- Promote indigenous foods and products for value added production, to stimulate interest in the use and assessment of indigenous fruit-tree resources.

Charcoal production

Charcoal production is an important activity that needs assistance through:

- Establishing of guidelines on wood utilisation in charcoal production taking into account the protection of the woody resources;
- Encouraging communal farmers to participate in charcoal production through the FSC to control "bush thickening";
- Conducting research into efficient charcoal making methods from bush encroachment species. For example, the development of efficient retorts currently underway.

Ecosystems conservation

Promote conservation of strategically important forest areas.

7.2 Institutional improvement

Training

The main weakness of the Directorate of Forestry is the shortage of qualified local forestry staff. It is therefore necessary to continue capacity building, particularly in forest management through short and long-term training programmes, and development of more human resources, especially forest extension workers.

Forest research

Initiate experimentation and provide scientific data on which to base decision-making on forest management, and conduct research into efficient charcoal making methods. Creatively exploit the available resources by adopting and developing new technologies to process wood and non-wood products.

7.3 Changes in resource use and management

Non-wood forest products

Namibia is in great need of data and information on NWFPs used by local communities but not well accounted for in the national economy. There is an urgent need to promote NWFPs that have been neglected so far, and to:

- Determine the nutrition content of many veld foods and examine potential health related issues from local NWFPs beverages;
- Document more comprehensively NWFPs traditional knowledge;
- Continue the on-going research efforts on the most appropriate and sustainable ways to harvest and manage medicinal plants.

Forest management planning

In order to achieve the objective of sustainable forest management in Namibia as stipulated by both the Forest Policy, and Forest Act of 2002, it is urgent to:

- Develop management plans for all forms of forest types and ownership in Namibia;
- Enhance and control the conservation, and utilisation of forest and woody resources;
- Establish mechanisms to enable people to benefit from conservation and management of all types of woody vegetation.

7.4 Enhancing the role of planted forests and trees outside forests

Trees outside Forests

There is need to develop simple but analytically valid methods for the collection of information on TOF such as on-farm trees in communal areas and the woody vegetation on commercial areas, and give room for information collected to reflect local priorities and also indigenous knowledge.

Afforestation/Reforestation

Both Namibia's Forestry Development Policy and Forest Act of 2001 advocate tree planting efforts. However, on the ground afforestation / reforestation programmes are still in their infancy and need to be developed. Despite the harsh and dry environment, that hampers tree-planting, there exists nevertheless a genuine potential that calls for:

- Establishing plantations to meet local peoples' needs for fuel-wood, fodder and construction poles;
- Conducting trials in plantation development, especially tree planting techniques for sand dune stabilisation, and planting activities including community based tree nurseries;
- Collaborating and exchanging information with other countries having similar dry environments to share lessons learned;
- Promoting the conservation of indigenous species;
- Setting aside land on resettlement farms acquired by government for tree planting purposes.

Urban forestry

It is recommended to develop cooperation between the MET and the municipalities to promote urban tree planting.

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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 a subsequent 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 the 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 on 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, and 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, as well as lessons learned and priority needs strategies and methodologies to enhance the role of planted forests, and trees outside forests in integrated landscape management as well as the economic significance of NWFPs. The country study reports will be published in English/French in advance of a subsequent 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**Tuesday April 30, 2002**

- Windhoek – Grootfontein (450 km)
- Afternoon Grootfontein area

Wednesday May 1st, 2002

- Grootfontein – Swakop then Walvis Bay (560 km)
- Afternoon Walvis Bay area

Thursday May 2nd, 2002

- Walvis Bay – Naukluft then Mariental (550 km)

Friday, May 3rd, 2002

- Morning Mariental area
- Afternoon Mariental – Gibeon - Windhoek (500 km)

ANNEX 3: PERSONS MET BY THE MISSION

ROBINSON, Donavan	FAO Representative in Namibia, Windhoek, Namibia
MUHIGIRWA, Louis	Programme Officer, FAO Representation in Namibia. Windhoek, Namibia
CHAKANGA Moses	Acting Deputy Director, Directorate of Forestry, Minister of Environment and Tourism. Windhoek, Namibia. chakanga@forestry.met.gov.na
HAILWA Joseph	Director of Directorate of Forestry, Minister of Environment and Tourism. Windhoek, Namibia. hailwa@forestry.met.gov.na
HAMID, Osman	Technical Adviser, Head of Forestry Department Ogongo Agriculture College. P.O. Box 5520, Oshakati, Namibia. osmanh@mweb.com.na oac@mweb.com.na
VERLINDEN Alex	Technical Advisor, National Remote Sensing Centre. Directorate of Forestry, Namibia–Finland Forestry Programme, Windhoek, Namibia
WATKINS, Anthony	Project Horticulturist, Parks Municipality of Windhoek, Namibia.
KAARAKKA, Vesa	Consultant Team Leader, Directorate of Forestry, Namibia–Finland Forestry Programme Windhoek, Namibia kaarakka@africaonline.com.na .
Dr. MAGGS- KÖLLING, Gillian L.	Head of Institute, National Botanical Research Institute. Private Bag 13184 Windhoek, Namibia. gmk@mweb.com.na
GALLOWAY, Ian	Director, Stewart Scott Namibia Jumbo Charcoal. PO BOX 3362, Windhoek, Namibia. iang@ssi.com.na .
GRAZ, Patrick	Polytechnic of Namibia, Department of Agriculture. Private bag 13388, Windhoek, Namibia. pgraz@polytechnic.edu.na
KRUGER, Bertus	Deputy Director, Desert Research Foundation of Namibia. Charcoal. PO BOX 20232, Windhoek, Namibia. bertusk@drfn.org
MASUKE, Matthews	District Forest Officer, Grootfontein, Namibia
MUHULI, Steven	District Forest Officer, Mariental, Namibia
Dr. SEELY, Mary	Executive Director, Desert Research Foundation of Namibia. Charcoal. PO BOX 20232, Windhoek, Namibia.mseely@drfn.org
Mr. DAWFON	Farmer (Gibeon, Mariental area)

ANNEX 4: DEFINITION OF USEFUL TERMS

Commercial land:	Privately owned land where profit is the primary aim.
Communal land:	Land available for common use; in Namibia this land is currently owned by the State.
Community:	All the people living in a specified area.
Conservancy:	An area of land shared by multiple owners or users who jointly pool their land and/or financial resources to make available a larger unit for management.
Degradation:	The diminishing of the productivity of land through mismanagement. NOTE: NOT CONVENTIONAL
Deforestation:	Change of land cover with depletion of tree crown cover to less than 10 % (FAO, 1998).
Desertification:	Land degradation in arid, semi-arid and dry sub-humid areas resulting from various factors, which include climatic variations and human activities (UNCCD).
Environmental forestry:	Management of forests, particularly strategic forests, for maintaining the quality of environment at a desired level in national and global contexts.
Forest:	Land with a minimum area of 0,5 ha where the tree crown cover (or equivalent stocking level) is more than 10 % (FAO, 1998).
Mahangu:	Pearl millet, <i>Pennisetum glaucum</i>
Oshana:	Shallow watercourse
Trees:	Woody perennial plants, which should be able to reach a minimum height of 5 m at maturity <i>in situ</i> (FAO, 1998)
Strategic forests:	Those forests which are considered most important for providing and maintaining forest services which contribute to the national and global well being.
Veld:	Field; grazing, pasture; hunting ground
4 -O regions:	Four regions in north central Namibia. Their names start with a letter 'O' (Omusati, Oshana, Oshikoto and Ohangwena) and form a bigger region known as OWAMBO (Ovamboland).

ANNEX 5: NAMIBIAN NATURAL FRUIT TREES

The most important natural fruit trees in Namibia are *Sclerocarya birrea subsp. caffra*, *Berchemia discolor*, *Diospyros mespiliformis* and *Hyphaene petersiana*. Other important fruit trees are *Schinziophyton rautanenii*, *Strychnos cocculoides*, *Strychnos spinosa*, *Adansonia digitata*, and *Acanthosicyos horridus*.

Following is an informative list of some of the best known fruit tree species of Namibia, with the description of their distribution, general biology, traditional uses, nutritional uses, socio-economic importance and potential for domestication.

The Manketti

Schinziophyton rautanenii is found in all of the Kalahari sands. It is a tree bearing fruits that ripen from February to April. The pulp of the plum shaped fruits is cooked or eaten raw but is also used to produce a hot liquor called *ombike* or *kashipembe*. The finely crushed nuts are used as spice for soup or gravy. The nuts yield high quality oil used in cooking and in the cosmetics industry. The shells of the nuts serve as fuel. Finally, Manketti leaves provide fodder. It has been reported that by selling three drums of manketti, one may feed a family of ten people for a whole year;

The Marula

Sclerocarya birrea subsp. caffra is a large fruit tree found in frost-free and relatively warm areas on sandy to loamy soils in the northern parts of Namibia. The sap of the Marula fruit makes a very sweet, non-alcoholic drink. It can also be fermented to give a famous wine, rich in vitamin C, with high-alcohol content. Marula fruits can also be processed to yield highly priced oil now exported (mainly by the CRIAA SA-DC Marula Oil Production Project) towards European market places for pharmaceutical purposes;

The Baobab

Adansonia digitata is a large tree found in northwestern Namibia, mainly in Omusati region. The pulp of the fruit is eaten as such or mixed with water to produce a tasty drink, rich in vitamin C; the leaves are cooked as vegetables and the bark is used as ropes;

The Makalani palm

Hyphaene petersiana is a tree found in many parts of Namibia on clay and salty soils, except in the Kalahari sands regions. The palms are shredded into thin strips and used for weaving baskets that are very much appreciated by tourists. Fruits are eaten raw or processed into a valuable brandy known locally as *Ombike*. Palm wine can be obtained by cutting the terminal bud of the fan palm but the process kills the tree and is therefore prohibited;

Other edible fruit trees in Namibia

These include *Strychnos cocculoides* (monkey orange), *Guibourtia colesperma* (large false mopane), *Ximenia caffra* (large sour plum), *Ziziphus mucronata* (buffalo thorn tree) used only for making a very high alcoholic-content beverage, and *Diospyros mespiliformis* (jackal berries) found in northern Namibia in the Caprivi region.

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