

**NATIONAL ACTION PROGRAMME FOR
MALAWI FOR THE UNITED NATIONS
CONVENTION TO COMBAT
DESERTIFICATION**

FOREWORD

On 13th June, 1996, Malawi ratified the United Nations Convention to Combat Desertification (CCD), an International Instrument for controlling land degradation in arid, semi arid and sub humid areas resulting from soil erosion, deterioration of the physical, chemical and biological properties of soils and long term loss of natural vegetation. As a party to the Convention, Malawi is obliged to formulate and implement a National Action Programme to Combat Desertification.

The programme is a result of issues and concerns expressed by Malawians on food security, water and sanitation, renewable energy, forest products and services, environment and indigenous knowledge. Almost 3 million people in Malawi live in dry lands which include the Rift Valley Floor from Karonga to Nsanje, the Phalombe Plain, some parts of Chiradzulu and Mpherembe in Mzimba. People in these areas are the most vulnerable to poverty as a result of long periods of food deficits, high illiteracy rate, poor access to water, high child and maternal mortality rate, high unemployment and low incomes. It is this abject poverty that leads to irrational decision making and livelihoods such as unsustainable cutting down of trees for charcoal production, over fishing and poor farming systems. Thus poverty reduction is central to the overall strategy of this programme and is, therefore, a tool for implementing the macro economic policy of reducing poverty in dry lands.

The programme takes into account all objectives and strategies. Its activities are incremental to what is happening in the sectoral programmes and it is hoped that much value adding will be achieved through the activities outlined in the programme. I urge you to support and participate in the programme.



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ACRONYMS AND ABBREVIATIONS

ADMARC	Agricultural Development and Marketing Corporation
CCD	Convention to Combat Desertification
DDF	District Development Fund
DDLGA	Department of District and Local Government Administration
DEMATT	Development of Malawian Traders Trust
DoE	Department of Energy
DoF	Department of Forestry
DoI	Department of Information
EAD	Environmental Affairs Department
EIA	Environmental Impact Assessment
ENRM	Environmental and Natural Resources Management
ESCOM	Electricity Supply Commission of Malawi
FINCA	Foundation for International Community Assistance
ICRAF	International Centre for Research in Agroforestry
IGAs	Income Generating Activities
IKS	Indigenous Knowledge Systems
MBS	Malawi Bureau of Standards
MEDI	Malawi Entrepreneurs Development Institute
MEET	Malawi Environmental Endowment Trust
MIPA	Malawi Investment Promotions Agency
MIRTDC	Malawi Industrial Research and Technology Development Centre
MoAI	Ministry of Agriculture and Irrigation
MoEST	Ministry of Education, Science and Technology
MoF	Ministry of Finance
MoGYCS	Ministry of Gender, Youth and Community Services
MoHP	Ministry of Health and Population
MoJ	Ministry of Justice
MoLHPPS	Ministry of Lands, Housing, Physical Planning and Surveys
MoNREA	Ministry of Natural Resources and Environmental Affairs
MoTCI	Ministry of Transport, Commerce and Industry
MoWD	Ministry of Water Development
NABW	National Association of Business Women
NCE	National Council for Environment
NDF	National Desertification Fund
NEC	National Economic Council
NGOs	Non-Governmental Organisations
NHBGM	National Herbarium and Botanic Gardens of Malawi
NRM	Natural Resources Management
OPC-DoSC	Office of the President and Cabinet – Department of Statutory Corporations
PWD	Public Works Department
SEDOM	Small Enterprise Development Organisation of Malawi
TEVET	Technical, Entrepreneurial and Vocational Education and Training
UNIMA	University of Malawi
WSM	Wildlife Society of Malawi

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Mr V.A.L. Mkandawire	Food insecurity
Ms E. Mbalame	Lack of safe drinking water
Mr L.B. Mhango	Overdependence on woodfuel for energy and income
Mr L. Sitaubi	Deforestation
Dr M.P.K. J. Theu	Declining use of indigenous knowledge and technologies

I have also used various UN documents and Leadership for Environment and Development (LEAD-Southern Africa) papers to provide a wider scope. These have been duly acknowledged in an uncirculated paper.

ISSUES PAPER FOLLOWING THE NATIONAL FORUM ON THE PLAN OF ACTION TO COMBAT DESERTIFICATION IN MALAWI

I BACKGROUND

Over 30% of the global area is affected by desertification. In May 1974 the United Nations General Assembly recommended that the international community undertake concrete and speedy measures to arrest desertification and assist the economic development of affected areas. In December 1974 the General Assembly decided to initiate concerted international effort to combat desertification and, in order to provide impetus to this end, the United Nations Conference on Desertification (UNCOD), was held in Nairobi, 29 August to 9 September 1977. The conference established that desertification was one of the major environmental and natural resource degradation problems of the globe and that its costs in human, social and economic terms were extremely high. UNCOD adopted a Plan of Action to Combat Desertification (PACD) with 28 recommendations. This was followed by three expert studies in 1978, 1980 and 1981 under General Assembly guidance.

In 1989 the General Assembly requested the Secretary-General, in consultation with the Executive Director of UNEP, to submit to the United Nations Conference on Environment and Development (UNCED) a report containing relevant expert studies. The report, released in 1991, concluded that despite the PACD and other efforts, the problem of land degradation in arid, semi-arid, and dry sub-humid areas had intensified, although there were "local examples of success". The UNCED (the so called Earth Summit) held in Rio de Janeiro, Brazil, in June 1992, offered an opportunity for world leaders to consider international laws for managing natural resources and their processes, in a new, integrated approach to the problem emphasising action to promote sustainable development at the community level. One of the most significant agreements reached at Rio was the decision to elaborate an international convention to combat desertification. This was one of the three conventions, the other two being the UN Convention on Biological Diversity (CBD) and the UN Framework Convention on Climate Change (UNFCCC).

The adoption in Paris on 17 June 1994 of a *UN Convention to Combat Desertification, CCD, in those countries experiencing serious drought and/or desertification, particularly in Africa* represented a major step in the response of the international community to the problems of drought and desertification. The convention entered into force on 26th December 1996, 90 days after the 50th ratification was received, and the first session of Conference of the Parties (COP) was held in October 1997. As of August 1999, there were 159 countries out of 188 United Nations member states which had ratified the Convention, including all African countries except Somalia. Malawi ratified the convention in June 1996.

Following on the Rio Earth Summit, and building upon the provisions of Chapter 12 of Agenda 21, the CCD has many innovative features which codify the most important

lessons learnt from efforts to combat desertification over the last two decades. Among these is the recognition of the importance of “putting people first” in efforts to reverse land degradation in areas affected by desertification and/or drought. Consequently, the CCD places a lot of emphasis on participatory approaches and on “bottom-up” iterative planning processes. In this regard, it obliges governments and other parties to ensure that decisions on the design and implementation of anti-desertification and drought mitigation are taken with the full and effective participation of local populations.

II SYMPTOMS OF DESERTIFICATION

The causes of the various forms of ecological degradation and corresponding socio-economic disruption stem from a combination of (a) human exploitation that overburdens the natural carrying capacity of the land resource system, as well as occasional increased negligence and abandonment of land use to the out-migration of people, (b) the inherent ecological fragility of the resource system, and (c) adverse climatic conditions, in particular severe recurrent droughts. Whether the process of desertification or its end result is considered, its most symptoms include:

- Reduction of yield or crop failure in irrigated or rainfed farmland;
- Reduction of perennial plant cover and biomass produced by rangeland and the consequent depletion of food availability to livestock;
- Reduction of available woody biomass and the consequent extension of distance to sources of fuelwood or building material;
- Reduction of available water due to decreasing of river flow or groundwater resources;
- Encroachment of sand that may overwhelm productive land, settlements or transport and communications systems;
- Increased flooding, sedimentation of water bodies, water and air pollution. Societal disruption due to deterioration of life-support systems that calls for outside help (relief aid) or that prompts people to seek haven elsewhere (the phenomenon of environmental refugees).

III CCD IN THE CONTEXT OF DEVELOPMENT OF THE ENVIRONMENT REGULATORY AND MANAGEMENT FRAMEWORK IN MALAWI

Malawi participated at the UNCED in Rio de Janeiro in June 1992. In response to the agreements concluded at the Rio Conference, Malawi started developing the National Environmental Action Plan (NEAP) in late 1992. A NEAP is an in-country, demand-driven process based on local participation and is intended to provide a framework for integrating environmental considerations into a nation’s economic and social development, incorporating a time-bound plan of actions for environmental policy, institutional and legal reforms, environmental assessments, corrective measures for ongoing projects, and new environmental investments.

Malawi’s commitment to address its environmental problems was reflected in the nation’s new constitution adopted in May 1995. Section 13(d) calls upon the State: “To manage the environment responsibly in order to-preserve the degradation of the environment; provide a healthy living and working environment for the people of

Malawi; accord full recognition to the rights of future generations by means of environmental protection and the sustainable development of natural resources; and conserve and enhance the biological diversity of Malawi.”

The Malawi NEAP, which was prepared using a highly participatory approach involving Government, the private sector, Non-Governmental Organizations (NGOs), the University of Malawi and traditional leaders, was formally launched in December, 1994. It describes the environmental situation and outlines a series of action that should be taken in order to redress the aggravating degradation and bring the utilization of natural resources within sustainable limits. Nine key environmental issues were identified, namely: soil erosion, deforestation, water resources depletion and degradation, high population growth, depletion of fish stocks, threats to biodiversity, human habitat degradation, climate change, and air pollution. The strategy for addressing each area of concern included necessary reforms in policy and legislation, and possible new investment programmes. The following are some of the areas identified in the NEAP and acted upon:

- ◆ *clearly defining institutional responsibilities and strengthening capacity (in progress);*
- ◆ *formulating Guidelines for Environmental Impact Assessments (EIA), (achieved), and instituting a mechanism for their implementation (in progress);*
- ◆ *developing an Environmental Information System (EIS) and a Geographic Information System (GIS) (in progress);*
- ◆ *elaborating and adopting a National Environmental Policy (adopted in 1996);*
- ◆ *developing sector policies and strategies: between 1995 and September 1999, the National Forestry Policy; a Water Resource Management Policy and Strategy; a National Irrigation Policy; a National Wildlife Policy; and the Agriculture and Livestock Development Strategy and Action Plan, have been finalized and adopted, and a Fisheries Policy has been developed in draft form;*
- ◆ *elaborating and in 1996 enacting an Environmental Management Act;*
- ◆ *Prepared and publishing in 1998 the first State of Environment Report.*

The National Environmental Policy (NEP) and all the other policies that have been adopted since 1996 promote the management of natural resources by the communities. This has been a move away from the former policies of enforcement by the government. This augurs well with the Convention to Combat Desertification which promotes community participation in the Natural Resources management.

To implement the NEAP, the Government embarked in 1994-95 on the preparation of the Environmental Support Programme (ESP), whose overall objective is to integrate environmental concerns into the socio-economic development of the country. The ESP is intended to provide the umbrella or planning framework for the government’s activities and interventions. The framework includes strategies, policies and priority programmes to address the environmental problems identified. Although a large number of projects and programmes were proposed, only those priority areas have been included which are consistent with the overall frameworks of the ESP and which will contribute to the achievement of its objectives.

IV PHYSIOGRAPHY AND CLIMATE OF DRYLANDS IN MALAWI

Desertification as defined in Box 1 affects almost three million people (about 30% of Malawi's population) who live on 2.8 million hectares of semi-arid and dry sub-humid dryland areas of the country stretching along the Rift Valley floor. This Rift Valley is an extension of the Eastern Africa Rift Valley. It is flanked by escarpments with steep slopes all the way from Karonga district in the north to Nsanje district in the south. In between lie the districts of Nkhata Bay, Nkhotakota, Salima, Mangochi, Machinga, Mwanza, Blantyre, and Chikwawa. Also included are the drylands of North Mzimba and the Phalombe Plain.

Box 1. Desertification

“The current perception of desertification is that it is *land degradation in arid, semi-arid and dry-sub-humid areas resulting mainly from adverse human impact*. This perception sets desertification within a broader frame of the world-wide degradation of land resources. Land includes soil and water resources, land surface and vegetation or crops. Degradation implies reduction of resource potential.....

Desertification is often related to the incidence of drought: failure of rainfall or rainfall less than annual average...[It] is a discrete process of land degradation throughout the drylands..... All over the world extensive areas of productive land are subject to ecological degradation. Damage is primarily due to excessive use. Exploitation beyond carrying capacity of the rangelands, cutting forest trees at rates faster than rates of regeneration, and over-dosing farmlands with irrigation water or agrochemicals are examples of unsustainable use. Reduction of plant cover leads to accelerated soil erosion and other forms of deterioration of the physical, chemical and biological attributes of soil and of the productive capacity of the land.

In summary, desertification is a form of ecological degradation of the productive land-and-water systems that is due to a combination of (a) inherent fragility of the systems and (b) overtaxing exploitation. This is a significant failure in resource management and it relates to world capabilities to produce food and other basic requirements for the escalating numbers of mankind.

Desertification like other forms of land degradation can be stopped. There is enough scientific knowledge and technological means to allow the implementation of programmes for combating desertification in the field in most instances.”

Source: UNEP 1991, p.7-8

It is not unusual to receive rains in the drylands amounting between 650mm and 800mm with most of it falling in six weeks, although wetter conditions can occur (Table 1).

The mean annual temperatures are in the region of 25°C. Soils on the slopes are shallow and stony. In the valley, the soils are generally deep and tend to range from colluvial sands to **makande** clays (vertisols). This climatic and edaphic reality supports *Acacia* vegetation type with *Faidherbia albida* (the White or Camel Thorn, **msangu**), *Raphia farinifera* (palms, **Chiwale**), *Adansonia digitata* (baobab, **mlambe**), *Sterculia quinqueloba* (**msetanyani**), and *Bauhinia petersiana* (**mponda**) dominating on the valley

floor while the hillslopes tend to have *Acacia nilotica*, *Pterocarpus angolensis* (**mlombwa**) and *Diplorhynchus condylocarpon* (**thombozi**). *Azelia quanzensis* (**msambamfumu**) dominates the river banks and the gorges.

Table 1. Agro-climatic conditions of the drylands of Malawi

District	Length of Growing Period (days)	Annual Rainfall (mm)	Dry Months
Karonga	150-225	800 to over 2000	5-8
Mzimba	135-180	600-1200	7-8
Salima	135-165	800-1200	5-6
Mchinji	150-195	800-1200	5-6
Dedza (Lakeshore)	135-150	800-1200	7-8
Phalombe	135-195	800-1200	7-8
Chikwawa	105-150	600-1200	7-8
Nsanje	105-150	600-1200	7-8

Source: Land Resources Appraisal Reports for ADDs

V CAUSES OF ENVIRONMENTAL DEGRADATION AND DESERTIFICATION IN MALAWI

1. EXTREME POVERTY

Malawi is among the poorest countries in the world with GDP per capita of US\$225 in 1993. Almost 60 percent of rural households live below poverty line of US \$40 annual per capita income. This poverty is also reflected in the average social indicators, such as high illiteracy (50%) and high infant mortality rates, and limited access to basic social services.

Poverty is also a factor in accelerating environmental degradation since the poor are usually unable and often unwilling to invest in natural resources management (for example, soil conservation and fertilizers). Degradation of the natural resources reduces the productivity of the poor who in fact heavily rely on these resources for their livelihood, and this makes the poor even poorer. Reduction in poverty will often lead to improved environmental quality and vice versa.

While there may be any number of opportunities to enact legislation to protect the environment, inform people on how and why to protect the environment and develop more efficient, environmentally friendly ways of using the environment's resources, none of these are likely to be effective unless poverty is reduced.

Alleviating poverty requires economic development, coupled with more equitable distribution of wealth and improved standards of living through access to essential services. Investment policies should provide an enabling environment for people to participate in the benefits of economic development. Particular emphasis should be

placed on development in the rural areas where the majority of Malawi's population still lives.

2. HIGH POPULATION INCREASE

At 9.8 million, Malawi's population has trebled in the past two decades and it continues to grow. The population is predominantly rural, constituting about 85 percent of the total. Of this, 98 percent derive their livelihood primarily from smallholder agriculture, with 55 percent having less than one hectare of cultivable land an amount inadequate to meet their food needs.

The major cause of high population growth is the high total fertility rate (TFR), which is the number of children a woman will give birth to in her lifetime. Malawi's TFR of 6.7 is one of the highest in Africa. This high TFR is due to several reasons, which include early marriage, early age at first pregnancy, relatively short birth intervals, and little knowledge of and access to modern contraceptive practices.

This increase in population translates directly into extreme pressure on land and other natural resources. The rapidly growing rural population, of 2.8% growth rate, has simply expanded into the space available to it. Population densities for areas particularly affected by desertification are given in Table 2a and their population growth rates are given in Table 2b. Many farmers are forced to cultivate on steep hillsides and other marginal lands and in many cases with inadequate soil and water conservation practices. The marginal areas which some people cultivate depend on high level of management skills, capital and technical investment which in most cases are difficult to obtain or not available at all.

The smallholder agriculture is extensive and its productivity is low, and the expansion of smallholder farming into marginal or unsuitable lands has already had large negative impacts on increased soil erosion, reduction of surface water supplier and alteration in lives.

Table 2a. Population Density for 1998, 1987 and 1977

<i>District</i>	Population density (Persons Km ⁻²)		
	1998	1987	1977
<i>Karonga</i>	58	44	32
<i>Nkhata Bay</i>	42	34	26
<i>Nkhotakota</i>	54	37	22
<i>Salima</i>	113	86	60
<i>Mangochi</i>	96	79	48
<i>Machinga</i>	97	80	52

<i>Mwanza</i>	60	53	31
<i>Blantyre</i>	389	198	191
<i>Chikwawa</i>	72	67	41
<i>Nsanje</i>	100	105	56

Table 2b. Annual population growth rates during
1987–1998

District	Intercensal annual growth rate % (1987 – 98)
<i>Karonga</i>	2.5
<i>Nkhata Bay</i>	2.0
<i>Nkhotakota</i>	3.4
<i>Salima</i>	2.5
<i>Mangochi</i>	1.7
<i>Machinga</i>	1.8
<i>Mwanza</i>	1.1
<i>Blantyre</i>	1.6
<i>Phalombe</i>	0.6
<i>Chikwawa</i>	0.8
<i>Nsanje</i>	0.5

3. HEAVY RELIANCE ON NATURAL RESOURCES

The Malawi's economy heavily relies on the natural resources. About 85% of Malawi's population live in the rural areas and derives its main income from agriculture that contributes about 70% of the GDP. For most rural dwellers, the cultivable land per capita is less than [one] hectare. When this scarcity of land is coupled with soil degradation and low levels of inputs and technology, the result is an increasing deficit in food production.

VI KEY ISSUES THAT EMERGED DURING NATIONAL CONSULTATIONS

The consultations which the National Steering Committee for CCD conducted in all the 26 districts of Malawi in the first half of 1999 revealed the following major areas of concern:

- Food insecurity

- Lack of safe drinking water
- Overdependence on woodfuel for energy and income
- Deforestation
- Declining use of indigenous knowledge and technologies
- Degraded environment
 - This general theme of issues has been covered in the above text, in particular Sections III and V.

1. FOOD INSECURITY

Food security implies availability, accessibility and affordability of sufficient food supplies of acceptable nutritional standard to all members of the household necessary for an active and healthy life. Food security has two main requirements: one is assuring the availability of food and the other is assuring the ability of households to acquire food. The concept addresses the risks of not meeting the dietary requirements.

Food insecurity is either chronic or transitory. Chronic food insecurity involves continuous inadequate diet caused by the persistent inability to acquire food by whatever means, such as, production, buying, bartering, sharing etc. Transitory food insecurity is a temporary decline in a household's access to enough food arising from instability in food prices, food production or household incomes. The following discusses the challenges in ensuring food security.

1.1 Challenges to Food Security

1.1.1 Social and Cultural Challenges

a) *Rapid population growth and declining land holdings*

Over the past thirty years or so population growth has almost doubled from 4 million in 1964 to just under 10 million in 1999 on 9.4 million hectares of land area and the size of land put under agriculture has been increasing at an average of about 1% per year. It has been estimated that 2,064,600 hectares (21.9% of total land area) were under cultivation in 1965 when population was about 4 million. Researchers have estimated that the amount of land under cultivation increased from 2,064,600 hectares to 4,641,350 hectares (49.2% of total land area) representing an increase of almost 27% over the period 1965 to 1992. Malawi has one of the highest population densities in Africa, with five people to the hectare of arable land which it has to feed from a single rainfall of only four months, mostly in a torrent during January and February.

Of the 9.4 million hectares of land area in Malawi, 32% is considered suitable for annual cultivation. Theoretically it means that from the above statistics about 17% of cultivated land is on marginal or unsuitable land. This could mean that Malawi has possibly run out of arable land so the population's increased requirements for food and cash are being met by expansion of agriculture into unsuitable land in many areas of the country rather than by increasing productivity.

Mean holding size has been decreasing over the years due to population growth. Researchers have reported a per capita smallholder land holding for 1990 to be 1.02 ha with 83.7% of the population having holdings less than 1.5 ha. A further projection of 0.60 ha is made for the year 2010 when population is expected to be at 11,414,460 at a growth rate of 3.25%. It is also expected that 96.2% of households will have less than 1.5 ha of land at their disposal.

Assuming an annual per capita requirement of 200 kg of maize, and a land holding of half a hectare, the garden must produce 2 tonnes of maize per hectare to feed a family of five. This is more than twice the present yield of 0.8 tonne per hectare. Nationally, the level of food deficit continued increasing until 1991/92 when the deficit was at its peak (Table 3). Actually, per capita consumption of maize has declined from around 200 kg/year in the early 1970s to 161 kg/year in 1995. As a result, malnutrition is very high amongst the rural smallholder farmers with small land holdings, who cannot afford fertilizer and seed inputs and are also unable to purchase adequate amounts of food due to lack of cash. It has also been estimated that only 4.8% of households in the country do not run out of food. This means that 95.2% of households cannot produce enough for themselves let alone for sale. This has alarming consequences on households' ability to sustain themselves. Most of these families are forced to go and sell their labour in form of casual labour (ganyu). This is done at a time when they are supposed to be engaged in farming activities in their own gardens to boost their production. These households are therefore caught in a hunger and poverty trap from which they cannot disentangle themselves. Researchers have estimated the proportion of smallholders with surplus grain reserves as representing only 13% of the rural population and 12% of the total population.

For some time, the country's food production has stagnated in the face of growing food demands (Table 3). The stagnation in maize yield in the light of increasing proportions of area planted to maize can partly be explained by the inability of most smallholder farmers to access fertilizers and that those who do, do so at very low rates of application. This has led to depletion of inherent soil fertility over most parts of the country.

Table 3. Estimated maize production and requirements ('000 tonnes)

Crop Year	Production	Requirement	Surplus/(Deficit)
1980/81	1237	1143	94
1981/82	1244	1211	33
1982/83	1369	1251	118
1983/84	1398	1292	106
1984/85	1355	1334	21
1985/86	1295	1376	(81)
1986/87	1218	1436	(218)
1987/88	1427	1467	(40)
1988/89	1520	1516	4
1989/90	1342	1617	(275)

1990/91	1589	1701	(112)
1991/92	662	1755	(1093)

Source: Christiansen and Southworth, 1988 and National Early Warning System for Food Security Bulletin, January 1991 (modified).

AIDS/HIV: The AIDS scourge has been with us since 1985 when the first 17 cases were diagnosed. From 1985 to June 1999, 53 000 have died of AIDS. On average 14% of adults are HIV positive and the proportion is rising. Close to a million people are already infected with the virus. AIDS will curtail population growth, but it is estimated that even in the worst AIDS scenario the population growth rate will slow down to 2.1%. A major effect of AIDS, apart from causing death of the most productive proportion of the population, manifests itself in the morbidity of a growing number of energetic people. This leads to depletion of productive labour force, thus reducing sources of income and support for many families dependent on such bread winners for food security.

Addressing population issues in relation to food security: Malawi has huge families, rapid population growth, tiny landholdings, and falling agricultural fertility. Its already high population density doubles every 28 years and this leads to further fragmentation of landholdings which are progressively experiencing declining productivity. Thus malnutrition continues to increase. It has been argued that Malawi has exceeded its carrying capacity and that the worsening trend must be stopped and perhaps reversed. Strategies include:

- i) Reduce fertility. If every Malawian mother were to have two children only, the population would still double. Most families have six or seven. The scenario calls for a serious dialogue on smaller families.
- ii) Use of improved technologies to increase food supply and maximize food utilization. There should be aggressive promotion of agroforestry (with the use of nitrogen-fixing species), use of manure and hybrid maize; establishing irrigation programmes; preventing postharvest losses and improving ways of food processing.
- iii) Fertiliser supply. Another option, though debatable, is a long term and possibly indefinite subsidy on imported fertilizer as a matter of necessity.

b) ***Traditional Practices***

Crop Diversification. The main subsistence crops in Malawi are maize, cassava, sweet potatoes, Irish potatoes, rice, sorghum and wheat in order of their contribution towards food requirements. As a food crop, maize accounts for about 93% of the population's food intake, ranking the highest among the staple foods (Table 4).

Table 4. Staple foods for the different areas

Staple Food	Proportion of population (%)	Locality
Maize	93	All upland and dry areas
Cassava	3*	Lake Shore

Rice	2*	Lake Shore
Sorghum	1*	Lower Shire
Millet and other	1*	Lower Shire and upland

*Assumed

Efforts towards diversifying to other food crops in addition to maize have been minimal. Maize continues to occupy more land even in areas where other crops have a comparative advantage. Each year, maize is taking up more and more of the cultivated land. The projection for the year 2010 is 1,127,030 ha representing about 66% of cultivated land and the other food crops only representing 27.3%. Table 5 shows declining maize production from 1983/84 to 1991/92 season possibly due to weather conditions, low inputs and a steady decline in soil fertility.

Table 5. Trends in maize production in Malawi

	1983/ 84	1984/ 85	1985/ 86	1986/ 87	1987/ 88	1988/ 89	1989/ 90	1990/ 91	1991/ 92
Area cultivated '000 ha	1183	1145	1193	1182	1215	1271	1344	1392	1362
Yield Kg/ha	1182	1184	1095	1017	1174	1188	999	1142	482
Production '000 MT	1398	1355	1295	1202	1427	1510	1343	1590	657

Source: Third Crop Estimates (1992 Price Review)

A major contributing factor to declining soil fertility is soil erosion. Soil erosion also contributes to siltation of water courses and arable land, flooding of fish breeding grounds and causing loss of property and lives, development of gullies, disruption of infrastructure and lowering of water table. The productive potential of the area goes down due to progressive loss of soil and soil fertility decline. The World Bank in 1992 estimated that between 4 and 11% of yield loss is due to soil loss. Soil erosion also results in water pollution and an increase in disease incidence and increased water treatment costs. For a country like Malawi, which is dependent on agriculture, reduced income is a further negative consequence. Table 6 shows rates of soil loss through water erosion. Recent (1999) estimates of soil erosion for Karonga actually exceed 50 to 100 tonnes/ha/yr.

Table 6. Soil erosion rates from runoff (tonnes/ha/yr)

District	Soil loss rate
Karonga	33
Mzimba	25
Salima	17
Mchinji	17
Dedza	32

Phalombe	32
Chikwawa	18
Nsanje	14

Source: World Bank, 1992

Eating habits: The rigidity presently inherent in the Malawian diet needs to be addressed with special programmes to achieve diversification to come up with products from other crops which can compete favourably with traditional foods.

Generalised farming systems: A farmer usually spreads out resources over many farming activities such as keeping various livestock, as well as cultivating maize, tobacco, groundnuts etc. Increased agricultural productivity is curtailed because the practices used are uneconomic and inefficient.

High illiteracy level: 71% of adult women are illiterate. Normally, illiterate people have a low knowledge of understanding. It is even worse in the case of women who are major players in attaining food security at the household level. Programs of universal education and adult literacy schools need to be enhanced by providing adequate infrastructure and personnel.

Gender imbalance: The African continent has generally shifted much of the burden of food production on to women. One study showed that while women shouldered 90% of the domestic work, they also contributed 50% labour when planting, 70% when weeding, 60% when harvesting, 85% during postharvest activities while contributing 50% towards livestock caring. However, the women are often denied access to agricultural loans and land title deeds on the one hand and proper research design into important food security activities they undertake is overlooked on the other hand. Addressing women's professional training to take up leadership positions, among a broad range of other considerations to improve the status of women, would therefore improve food security.

Land Tenure: Malawi's land tenure can be grouped into four categories namely customary, public, private and freehold. It has been alleged that absence of legal title to the land in customary tenure has had adverse impact on the management of land because of insecurity. This argument has, however, been challenged because once a person has been allocated a piece of land, the right to use it is permanent and defensible just like titled rights.

Over the past three decades there has been a phenomenal increase of leasehold estates, from 111 in 1967 to 30,000 in 1994. This increase in private land is at the expense of customary land. The more pressure there is on customary land the more possessive customary land holding should become. This should therefore give people as much incentive to sustainably use land as those who own private land. However, the way resources are being managed does not reflect this reality. This is due to several other problems such as poverty and inadequate access to information on sustainable development such that the poor are unable to make the critical trade off for the long term benefits.

Title rights under leaseholds should also have theoretically worked towards proper conservation of resources but this has only been the case on tea estates in Thyolo and Mulanje, and not on tobacco estates which occur all over the country. The lease covenants are not adhered to because estate owners strive for short-term benefits and the government, which is responsible for policing and bringing the culprits to book, is financially unable to do so. In addition, the punitive measures meted out are not dissuasive enough because they are light. The consequences are that leasehold land just like land under customary tenure has experienced adverse environmental effects whereby the emphasis on most estates has been on growing of tobacco for commercial gain and maize to feed tenants without due attention to conservation practices.

Most public lands were set aside as catchment areas, wild life reserves and game parks and forest reserves. Their status has remained so ever since they were declared except in very special cases where some parts have been degazetted and given to local communities. Most of the project area under desertification falls in the customary land tenure category. Private land is found in patches.

The foregoing shows that the increase in private land has increased pressure on customary land which is now vulnerable to degradation. There is therefore need to revise the way land is held in order to provide incentives to maintain the soil fertility for food production.

1.1.2 Political Challenges

a) *Civil unrest*

War and civil unrest are a ready recipe for food insecurity. They are avoidable through solving political differences by dialogue. Only politicians can ensure that there is political will to do so.

b) *Maladministration*

There is need to have sufficient analytical capacity which can provide updated and adequate information on the food security status of various localities at various times. Such area-specific baseline data should be used for planning purposes to avoid making inappropriate policies that will not address food insecurity at the household level. Political appointments which disregard requisite qualifications for positions that demand such analytical skills can only result in misguided policies that worsen food security.

1.1.3 Economic Challenges

Major constraints that have a bearing on food insecurity stem from the type of macro-economic policies the government implements; the magnitude of poverty; unemployment rate; lack of income-generating activities; absence of incentives for food production; instability of the market prices for agricultural products; unfair trade terms at

international, national and local levels; high cost of foreign exchange which often affects the capacity to import; increase in budget deficits; and low level of investment in agriculture.

a) ***Poverty***

This has already been dealt with above as the main cause of environmental degradation. It is also responsible for the rural-urban migration of the labour force. Typical characteristics of the rural people deprived of access to necessary tools for food security as a result of poverty include shortage of cash, landlessness, poor sanitation, poor health and no access to credit. Strategies to address the welfare of these disadvantaged masses to bring them out of the poverty trap should include: a) development of micro-enterprises, and b) access to credit.

b) ***Macro-economic environment***

Malawi's predicament is commonly seen as an economic one. The macro-economic environment plays a critical role to ensure food security: the exchange rates, trade policies, fiscal and monetary policies, inflation rate - they all have an effect. Malawi must develop the economy so as to generate exports to earn foreign exchange and buy grain on the world market. However, external debt that she owes must be cancelled because debt servicing absorbs twice as much money as that spent on social services.

1.1.4 Natural Factors

Preparedness to face natural disasters such as floods, geological hazards (earth quakes, landslides, etc), strong winds, drought and pests, involves having in place a good Early Warning System as part of a coordinated effort in a National Disaster Management Plan that emphasises mitigative actions. In the case of food security, there must be established strategic grain reserves while irrigation and growing of drought and disease resistant varieties will ensure food availability.

2. LACK OF SAFE DRINKING WATER

The government has made some considerable effort to provide the rural (making up 85% of the 9.8 million total population) and urban communities with safe and potable water. More than 13,000 boreholes have been constructed while there are 63 rural gravity-fed piped water supply schemes and 55 urban water supply schemes. However, despite these efforts the coverage of the water services are still very low, hence the majority of the rural population still draws its water supply from the traditional unprotected sources such as hand-dug wells, springs or open streams, rivers and lakes.

The situation in urban or semi-urban areas is slightly better than in the rural areas. The 55 urban water supply schemes servicing the population and industries in the urban and semi-urban areas draw from surface water resources. The five water boards including the

recently established Regional Water Boards are charged with the responsibility of delivering water supply and providing waterborne sanitation services in Malawi. These are the Blantyre Water Board (BWB), Lilongwe Water Board (LWB), and three Regional Water Boards. BWB and LWB are responsible for delivery of water in Blantyre and Lilongwe, respectively, while the Northern, Central and Southern Region Water Boards are responsible for delivery of these services in the urban centres in the three respective regions apart from Blantyre and Lilongwe cities.

Most of the water supply schemes (both urban and rural) in the country obtain their water supplies directly from the rivers without any storage facilities in form of reservoirs. These rivers are less reliable during dry months where considerable low flows are presently experienced. The situation of unreliable dry season flows has been exacerbated by deforestation and poor land use practices within the catchments. Unfortunately the strong seasonality of the rainfall, and the considerable variation in total rainfall from year to year means that the supply of easily available water is limited. This existing problem is aggravated by the tendency for changes in land use and deforestation which reduces infiltration, reduces dry season flows and increases the occurrence of floods. The headwater and marginal land areas have been cleared of vegetation cover particularly forests and trees. The clearing of vegetation cover has eventually resulted in increased siltation in rivers and occurrence of floods. Increased population growth has resulted in cultivation and settlement in marginal lands. In some cases, people have actually encroached on protected or gazetted lands such as national parks, game or forest reserves, resulting in increased runoff without sufficiently recharging the groundwater aquifers. The current deteriorating situation in terms of water resources throughout the country has become one of the major environmental problems as identified in the National Environment Action Plan (NEAP) report of 1994.

The Ministry of Water Development and other agencies that deal with water are concerned with the management of the water resources, the supply of water for human and animal consumption, industrial use and crop production. Safe water is basic water and is the essence of life, but can be deadly if contaminated. A safe source of water can help alleviate some of the water aspects of poverty and give children the chance to grow up healthy in body and mind. Water is life and so we cannot allow life to die when we have all the necessary means and ways to sustain it. Population increase and the rapid expansion of the economy means that a greater demand is being placed on the resources and very careful planning and development of the resources will be required if future demands are to be met.

In the face of the rapidly changing environment due to climate change and human activities, such as farming in marginal areas due to increased population pressure, construction of roads, buildings, industries and all forms of transport, it is important to look critically at environmental problems affecting water, and final solutions should be provided to combat these problems.

2.1 Purposes of Water Resources

There are several categories of use of water in Malawi other than for drinking purposes. All the uses of water resources are, however, affected by similar problems. Although this section will concentrate on drinking water supplies in relation to desertification, it is also important to bear in mind these other uses as discussed below.

2.1.1 Domestic water supplies

More than 65% of Malawi's population have access to safe drinking water. This translates into 85% of the urban population and 45% of the rural population. The overall average is one of the highest in Africa. However, both rural and urban water supply systems suffer from significant operational problems. It is estimated that currently only one third of the rural population has access to improved water supplies. Similarly, recent surveys indicate that the figures for urban areas is in the order of 60-70%.

2.1.2 Hydro-power generation

The hydropower potential is concentrated on the Shire River. Its estimated total capacity is about 600 MW which would provide nearly 3500 GWh of electrical energy. About 98% of electricity available in Malawi comes from the Shire River alone, with a design flow of 170 m³/s. Although hydro-electric power generation does not reduce the quantity of water in rivers, it does create an extremely large demand on the resources in that a very high minimum flow in the river must be guaranteed

2.1.3 Navigation

Lake Malawi and Shire river both play an extremely important role in the national communications systems. At present the lake provides the basis for an extremely effective goods and passenger communication system to many parts of the Northern and Central regions. Thus the lake services 200,000 passengers and 100,000 tonnes of cargo annually by ships and boats. However, the sailing and docking of these is vulnerable to water levels, lake depths and waves. The lower Shire is used for the movement of produce from the large estates. The future of the lake ports is enhanced by the development of the Lake Shore road and laterals and the upper Shire will regain importance in parallel with the development of the Liwonde as an industrial centre and communications link.

2.1.4 Fisheries

Fish is an important part of the diet in all sections of the community, providing the essential animal protein (30-70 percent). The fishing industry is important as a source of cash income and adding to the subsistence economy. It also provides foreign exchange through the export of aquarium fish. The principal requirements of fisheries are that the variation in water levels should follow as natural a pattern as possible, and that the quality of the water should be as high as possible. However, very little water quality data (nutrient levels, movement and other characteristics) is available from limnological studies of the lake.

2.1.5 Recreation

Tourism is a major industry, and is placing a significant and growing demand on water for recreation use. With increasing standards of living the non-tourist demand for water recreation is to increase.

2.1.6 Irrigation

The greatest sectoral use of water by far is irrigation. There are about 3,000 hectares of government projects, mostly for rice and sugar production, with total licensed demand of 850 m³/day. More than 20,000 hectares are being irrigated from the rivers, demanding about 20 m³/s. The copious waters of Lake Malawi have hardly been exploited for irrigation and conveyance over land to supply the needs of growing urban centres.

2.2 **Sources of Drinking Water**

Most of the water supply schemes (both urban and rural) in the country obtain their water supplies directly from surface water resources such as rivers, lakes, springs and groundwater sources. The sources of drinking water supply are basically grouped into:

2.2.1 Surface sources of water supply

There are many sources of surface water which are used to supply water to people in villages and town centres. Examples of surface sources of water supply are lakes, rivers, and springs. Water Supply Projects such as Mpira-Balaka, Dombole, Champhira and Lilongwe City are deriving their water from surface water sources. Most people in rural areas obtain their drinking water supply directly from unprotected sources such as lakes, rivers, springs and groundwater.

The origin of most of the surface sources are forest reserves. These reserves are now being progressively destroyed because of careless cutting of trees for building, firewood and other uses. It is clear from the observations made in the river flows that these sources are dwindling. It has also been observed that the more the trees are cut and the more bare the ground is exposed, the less the flow. Eventually, if the problem is not checked and corrective measures taken, there will be no water from the surface sources. Even big dams and lakes will slowly reduce their capacity.

2.2.2 Groundwater sources of water supply

Malawi has currently over 13,000 boreholes that are used as sources of water for human consumption in both towns and villages and for irrigation of crops. In some areas people have hand-dug shallow wells. Recently it has been observed that these wells are drying

up and in some areas boreholes are also drying up due to lowering of groundwater tables. This is giving more pressure to borehole contractors as they have to drill deeper than before to reach more water. If human beings are facing this problem, then plants, especially the shallow rooted ones, are endangered too. If this situation is not checked, only deep rooted plants will remain. This is rapidly contributing to desertification and is a very worrisome situation for existence.

2.3 Causes of Desertification and its Impact on Drinking Water Supply

2.3.1 Population pressure

The available resources are not increasing to meet the ever increasing demand from a fast-growing population. The growing numbers of the large rural population means that there is a greater demand being placed on the resources and there is need for careful planning and development of the resources so that water supply is sustained.

2.3.2 Catchment encroachment

Encroachment of protected catchments, through deforestation, human settlement and cultivation of marginal lands, is an issue of major concern in Malawi today. This particular type of pressure increasingly being exerted on water resources brings about declining base flows, deterioration of water quality, reduced groundwater recharge rates, increased turbidity of water in rivers and reservoirs and increased incidences of flood disasters.

2.3.3 Poor land husbandry practices

Despite the government efforts to educate farmers or the public on proper land husbandry practices to conserve both soil and water, people still have not abandoned their traditional methods of farming. This has led further to water resources degradation. More effective training programmes are needed.

2.3.4 Agro-chemical use

While the application of agro-chemicals has led to pest control and increased food production, it has equally contributed towards the degradation of water resources. The increased deterioration of water quality in most of the water resources which are the sources of water supply can lead into a major health hazard to people as well as the livestock. The contamination is very expensive to treat and if undertaken can seriously affect the financial resources of water providers.

2.3.5 Institutional and legal constraints

The government of Malawi's policy is to reduce the incidence of water borne diseases and reduce the time devoted by individuals to water collection. The Water Resources Act

such as the Water Act and other Acts that deal with the use of water as well as its management have been found to be inadequate in that they do not cover all the relevant issues related to water resources management, especially in the area of taking positive measures against offenders and are not keeping pace with the ever changing environment. The proposed implementation of institutional arrangements or other strategies mentioned in the current policy have no time frame nor the implementation plan or targets. The weaknesses and strengths of these institutions should be translated into policies to ensure that they have the capacity not only to implement the National Water Resources Management Policies (NWRMP), but also integrated management.

2.3.6 Lack of public awareness

Water resources degradation and depletion have resulted from a number of man's activities such as deforestation, poor land husbandry practices, improper disposal of sewage and industrial waste and effluents. However, there is generally lack of adequate public awareness or education on these problems.

2.4 **Effects of Desertification on Drinking water supply**

2.4.1 Water scarcity and droughts

The water resources are becoming inadequate and scarce to meet the demand due to increases in population and demand for other water uses such as industrial production and irrigation requirements. Climate change has resulted into increased seasonal variability in the run-off. This problem has basically arose as a result of droughts, with the resultant unreliable seasonal flows. The 1991/92 and 1994/95 droughts showed the vulnerability of water supply schemes which were affected by the variability of seasonal run-off, since most of the schemes rely on direct run of the river which is then greatly affected in case of hydrological demand for domestic needs, industrial production, and irrigation requirements.

There are frequent occurrences of droughts that are initiated by the El Nino and Southern Oscillation (ENSO) phenomena. These have resulted in declining amounts of both surface and groundwater resources due to inadequate amounts of rainfall to replenish water resources.

2.4.2 Sedimentation (siltation)

Clearing of vegetation cover has eventually resulted in increased soil erosion (see Table 6) and runoff resulting into increased siltation in rivers. Silt loads (sedimentation) in surface runoff from soil erosion lead to significant problems in down stream water quality, including increased suspended solids and turbidity resulting in high water treatment costs and water flow problems. Since the majority of the people reside in rural areas and depend on rivers for water supply, chances of drinking unclean water are very high.

As shown in the case studies carried out, catchments with high deforestation rates have faced decreased levels of flow discharge, which in turn have led to increased levels of turbidity and solids. High sediment loads in the rivers bring about siltation of rivers (where the gradient is low) and of water reservoirs. The silted river courses and water reservoirs tend to have reduced capacities and when it rains the banks may overflow, causing flooding at times as has always been the case in Shire River Valley and its major tributaries, or the water erodes the bank (in order to accommodate the increased volume of run-off). The intake point for Nkula Hydro-Electrical power reservoir, for instance, is frequently dredged for this reason. Such is the case also with many sources of drinking water supplies countrywide.

2.4.3 Chemical contamination

With the increase in use of marginal land, and cultivation of protected areas, and loss of soil fertility, use of agrochemicals such as fertilizers, pesticides and insecticides become inevitable in order to achieve increased productivity. However, runoff of agrochemicals resulting from poor conservation measures may have a detrimental effect on the quality of the water of a number of water resources (i.e. rivers, streams, lakes, groundwater sources etc). The chemicals may result in eutrophication of the water bodies, leading to increase in growth of the water plants. This threatens fish resource growth and reproduction. Some poisonous agrochemicals can even cause death of fish in rivers apart from posing threats to human health through consumption of contaminated fish.

2.4.4 Encroachment problems

Encroachment into marginal or catchment areas has led to flashy runoff that rapidly runs without sufficiently recharging the groundwater aquifers. Most of the boreholes or shallow wells are drying up in these areas due to poor groundwater recharge thereby reducing the water table. It is now common to see rivers from these areas drying up or experiencing dwindling flow even if it could be in normal years in terms of rainfall.

2.5 **Current Efforts in Water Resources Management**

2.5.1 Catchment areas protection and rehabilitation

Catchment areas are nowadays increasingly becoming bare with the wanton cutting of trees and inappropriate agricultural practices. Under the National Water Development Programme (NWDP), the Ministry of Water Development in collaboration with other ministries such as Agriculture and Livestock Development, the Forestry Department and Environmental Affairs Department, with the help of communities, are working hard to help in protecting the catchments thereby improving the quality and quantity of surface water sources. At least 15 catchments of the urban and rural water supply schemes are to receive similar initiatives of community based catchment protection and watershed management.

2.5.2 Songwe River stabilization

The project is aimed at stabilizing the course of the river and reduce local flooding, develop agriculture and fisheries, generate hydropower, and fix the international boundary in the lower reaches of the river before flowing into Lake Malawi. This project will also help to solve the siltation problem in the river which serves many people as a source of drinking water.

2.5.3 Lilongwe Water Board Catchment Protection

In 1993, a water resources control order was issued to declare the Lilongwe Water Board Catchment Area a controlled water area in which certain human activities were being prohibited within the catchment for the purpose of protecting the water resources under the Board's catchment. This project has proved to be effective in that it has helped reduce the incidence of siltation and chemical contamination of the source of drinking water for the city. Similar orders are in the planning stages for the rest of the Water Boards.

2.5.4 Natural Resources Conservation Management and Support Programme (NATURE)

Natural Resources Conservation Management and Support Programme (NATURE) is funded by USAID in which the government is to undertake review and harmonise the natural resources management policy, legislation and institutional roles of various government institutions dealing with the natural resources management. All these programmes and initiatives have a strong component of water resources management particularly conservation and protection.

2.5.5 3000 Boreholes project

The Ministry of Water Development is addressing the water supply, sanitation and management for the rural and semi urban population in a project, started in 1997, of drilling 3000 boreholes throughout Malawi. This project is sponsored by the Malawi Government and is aimed at providing safe water to the rural poor especially women and children who had to walk long distances to fetch water. A community based management approach is being used so that the communities feel the sense of ownership and are able to manage the boreholes and its surrounding areas well. At present about 2000 of the 3000 boreholes have been drilled.

3. OVERDEPENDENCE ON WOODFUEL FOR ENERGY AND INCOME

In Malawi, 90% of the population depend on woodfuel as the source of energy. Energy consumption is dependent on a balance of 93% woodfuel, 3.5% petroleum, 2.3% electricity, 1% coal and 0.2% other biomass fuels. The massive use of traditional energy sources is an indication of acute poverty and a rural based economy. This is why sustainable renewable energy issues have been included in the Poverty Alleviation Policy Framework as a way of recognizing the extent of the problem in the country.

Well over 30% of the rural population depend on selling wood products for their survival. About 20% of the wood products are sold as woodfuels. It is estimated that wood consumption exceeds sustainable supply by 2.37 million cubic metres. Expressed into deforestation, the deficit translates into net clearing of 50,000 hectares a year. This situation is aggravated by rapid population growth currently at 2.8%, expansion of the estate sector, rampant poverty and an underdeveloped renewable energy subsector.

3.1 Issues Impinging on the Limited Development and Use of Alternative Energy Sources

In the energy sector there are several issues which have been identified as having a negative impact on the use of alternative sources of energy. Some of these issues are as follows:

- limited affordable alternative sources of energy to woodfuels;
- limited utilization of some biomass materials of agricultural wastes;
- low efficiency of biomass conversion technologies;
- low efficiency of woodfuel end-use devices;
- unsustainable use of woodfuels and other biomass resources leading to deforestation and land degradation;
- low access to energy services from other renewables due to:-
 - ◊ high initial capital cost,
 - ◊ lack of appropriate delivery mechanisms and dissemination schemes,
 - ◊ limited information on renewables;
- poor track record of the systems installed so far;
- poor support structures and policies as shown by:
 - ◊ lack of trained technicians/artisans,
 - ◊ lack of incentives/rigid fiscal regimes e.g. no exemption of duty on solar panels, and
 - ◊ limited numbers of professional in the energy sector;
- limited affordability of electricity and end use of devices;
- low access to electricity due to restrictive distribution policies, high wiring costs and capital contribution requirements;
- lack of Community Power Producers;
- lack of local manufacturing of end use devices and accessories.

4. DEFORESTATION

The forest estate in Malawi is estimated at 27.6% of the total land area of 94,000 square kilometers. This estate consists of forest resources and protected hillslopes, national parks and game reserves and customary land forests. Plantations and woodlots, both state and private, constitute almost 222,000 hectares of which a

quarter are on the Viphya Plateau producing softwood, initially meant for pulp and paper but now put to timber production. In general, much of the forest estate is in the north where the population is the smallest and sparsely distributed than in the other two regions of the country.

Clearing of the forest estate, especially on customary land, has been a function of developments in other sectors of the economy, especially in agriculture. Between 1972 and 1990 clearing of forests for agricultural expansion and roads construction was at a rate of 1% annually in the Rift Valley (Table 7).

This change of land use is what is termed as deforestation. We shall examine the extent of this phenomenon with regards to the ecosystems and livelihoods of the population of the drylands of the country, and suggest a framework for mitigating it.

Table 7. Changes in forest cover in the Rift Valley Districts (1972-1990)

District	District Area (Km ²)	Forest Cover (Km ²)		Forest Cover (%)		Average Annual loss of Forest (ha)
		1972	1990	1972	1990	
Karonga	3,422	2,864	2,351	83.7	68.7	2,850
Nkhata Bay	4,508	2,878	2,632	63.8	58.4	1,367
Nkhotakota	4,282	3,211	2,222	75.0	51.9	5,494
Salima	2,121	596	159	28.1	7.5	2,428
Mangochi	6,750	4,433	2,577	65.7	38.2	10,311
Machinga	6,104	2,233	952	36.6	15.6	7,117
Mwanza	2,310	1,498	710	64.8	30.7	4,378
Blantyre	2,014	919	614	45.6	30.5	1,694
Chikwawa	4,868	2,690	1,619	55.3	33.3	5,950
Nsanje	1,967	987	663	50.2	33.7	1,800

4.1 Forests in the Drylands of Malawi

The drylands of Malawi are predominantly in the Rift Valley Floor, North Mzimba and the Phalombe Plain. They have been already described in Section IV. Due to high population growth (Table 2), agricultural development and construction of roads and other infrastructure, most forests in the valley have been cut down. Nobody knows yet the type and number of species lost as a result of such deforestation. This may have contributed to biodiversity loss.

However, some trees of *F. albida* and *S. quinqueloba* are left standing in gardens by the farmers. The former is a soil-enriching tree, which contributes to the nitrogen budget in the soil thereby improving crop productivity; the latter is considered a protected tree. Other trees which dominate home surroundings are *Moringa oleifera* (**cham'mwamba**), *Zizyphus mauritiana* (**masau**) and *Azadirachta indica* (neem).

4.2 Livelihoods

The Rift valley is a stretch of Lake Malawi, Lake Malombe and Shire River. As a result most people living in the Rift Valley Districts largely depend on fisheries resources for their livelihoods. There is more exploitation of fish resources in the shallow waters, especially in the southern tip of Lake Malawi, than in other parts of the lake. As a result there is overexploitation in Mangochi than in any other Valley District. The deep waters are said to have adequate stocks of fish, but their exploitation is dependent on improving the gear which the local people are unable to afford. Unfortunately, the fishing company, Maldeco, has also not yet invested in these gears. Thus Maldeco is competing with the local fishermen in exploiting the shallow waters.

Recent growth in the fish industry has in turn stimulated a corresponding demand for fuelwood and canoes. Due to low wood productivity and limited supply, over-harvesting of wood on the steep slopes of the escarpments can be seen. The prevailing high population densities (Table 2a) lead to low landholding of arable land of under 0.5 ha. The small landholdings coupled with poor agricultural practices lead to poor harvests. In the hope of improving harvests subsistence farmers encroach into forest areas which are marginal such as the hillslopes.

Handicrafts including ebony curios, mats and toys made from palm leaves are sold to tourists and other visitors who come to enjoy the lake. There is a growing demand for curios and toys on the European markets such as in Germany. Thus handicrafts are increasingly becoming an important source of employment and income in Mangochi, Salima and Nkhata Bay districts where holiday resorts have been developed.

The growing demand for fuelwood and curios and clearing of marginal areas for agriculture are the major causes of deforestation in the dry lands. Due to the short rainy season and other precarious conditions, recovery of the woodlands from natural regeneration is slow. This is made worse by animals such as goats and cattle that browse and trample on the saplings. Late bush fires also destroy saplings, especially those of *A. quanzensis* and *Acacia*. As a result of persistent bare steep slopes there are avalanches every year that end up sweeping away bridges and piling up debris along the lakeshore roads. Breeding grounds for some rare fisheries are also destroyed by siltation, in addition to fertilizer residues that come along with sediments from the uplands.

The foregoing underscores the role poverty plays in causing deforestation. It is lack of alternatives to sustainable livelihoods that trap people of the Rift Valley in irrational

behavior such as overcutting wood for fuel and curios on one hand, and overcultivation and encroachment into marginal areas for food production, on the other.

It is, therefore, crucial that any framework for solving deforestation and, indeed, other forms of environmental degradation that enhance land degradation, should tackle poverty as a central objective. This poverty is expressed in terms of insecurity of food, energy, employment and income sources. It is also critical that the skills base of the population is taken into account so that adequate empowerment can be achieved in the long term.

5. DECLINING USE OF INDIGENOUS KNOWLEDGE AND TECHNOLOGIES

Historically, rural communities have acquired detailed knowledge, skills and strategies based on their interaction with the local environment over long periods of time. This stock of knowledge permeates the social structure and it is the basis for local-level decision-making in agriculture, food preparation, natural resource management, and a host of other activities in rural communities. The African tradition is rich in intricacies and, when properly understood, demonstrates the African appreciation and constant harmony the community strikes with nature, and how observations are precisely expressed for communication, such as through songs, taboos, totem animals, custom laws and practices, place names and nicknames, riddles and proverbs - all these have a story to tell.

Such a complex collection of knowledge, described as indigenous knowledge systems (IKS), ethnoscience or traditional wisdom evolves over time, has collective ownership and is communicated orally from one generation to the next. Before rural communities experienced any institutionalised foreign intervention, it is these indigenous knowledge systems that have regulated the level of exploitation and utilisation of environmental resources and ensured their survival - a desirable outcome we now link to the word "sustainable". However, it is now widely recognised that most valuable traditional ecological knowledge is being eroded and lost for good for various reasons. Over the past two decades serious initiatives have been launched to restore the recognition of indigenous knowledge.

In fact, when the world leaders met in Rio de Janeiro, Brazil, at the United Nations Conference on Environment and Development (UNCED), the so called Earth Summit, in June 1992, they endorsed Agenda 21, a blue print of the post-Rio Plan of Action on environment. Chapter 26 of Agenda 21 states that "...Governments and international organisations should recognise the values, traditional knowledge and resource management practices that indigenous people use to manage their environments, and apply this knowledge to other areas where development is taking place. They should also provide indigenous people with suitable technologies to increase the efficiency of their resource management."

5.1 The Complexity of Indigenous Knowledge Systems

The nature of IKS and its systematic linkages are very complex. Researchers have been able to identify and describe four sets of IKS facets. These are briefly summarised in the context of the Malawian situation.

5.1.1 Religion: taboos, ceremonies, rituals, myths, beliefs, institutional arrangements, conflicts. In Malawi, forms of religion that could provide lessons in environmental preservation are *M'mbona*, *Gule wamkulu*, and *Kachisi*. There are also rich customs and practices concerned with graveyards, initiation ceremonies, and taboos and beliefs about inedible plant and animal species which directly or indirectly influence conservation. In some cases, however, beliefs are engulfed in secrets and this may be a hindrance unless one is formally initiated into the system.

5.1.2 Production systems: institutional arrangements, technology (gender dimension), resource tools, labour, marketing and processing, storage. Some of the consideration could be made on lessons from fallowing and shifting cultivation practised in the traditional system of agriculture, while the role of women in the labour market provides rich sources of information.

5.1.3 Environment: access and control of resources, utilisation, rules and regulations, institutional arrangements. Land tenure and economic security as determined by traditional systems of marriage, such as *chikamwini*, *chitengwa*, *chilowoka*, have an important bearing on natural resources management.

5.1.4 Social: socio-political, institutional arrangements, structures, health, technology and knowledge transfer to the young generations. Social organisation enables certain important systems of information to be passed on in areas such as warning systems (by observing swallows, red ants, owls, *nkhwezule*), family planning methods, use of nature for medicines, rules of social stratification, and inheritance practices, all of which may have a bearing on natural resources management.

5.2 Selected Applications of Indigenous Knowledge in Malawi

There are many examples of use of traditional knowledge. Examples given here are mainly drawn from the biodiversity conservation to make a direct link of IKS to fighting desertification. This in no way is meant to underplay other forms of IKS.

5.2.1 Domestication of guinea fowls

An old practice in the villages was to use a foster chicken to hatch eggs. It has been documented that those who had domesticated guinea fowls and were breeding their own placed guinea fowl eggs collected from the wild into a chicken's nest when it starts to brood. But then the chicken's eggs were removed so that guinea fowl eggs got a 7-day headstart, after which the chicken eggs were replaced in the nest. The differential in brooding time ensured that hatching of eggs of the two species occurs together 21 days later. This has now generated a technology that has resulted into the rearing of guinea fowls as a common

venture and is now being supported by a scientifically-based breeding programme ready for dissemination.

5.2.2 The Role of the Community in Biodiversity Conservation

In Salima District, Central Malawi, the local chief established a period from end of November to end of March or April during which fishing was not allowed in order to allow fishermen to cultivate food crops. Interestingly, this closed season coincided with the breeding period of fish. Secondly, in Mangochi district, the chief was able to control the number of fishermen operating in his area because newcomers had to ask for permission to be admitted, thus avoiding overfishing.

5.2.3 Detailed Knowledge of Biodiversity

Research conducted at Bunda College of Agriculture has shown that the diversity in variety/landraces of beans in Malawi owes it to indigenous knowledge in plant science. A number of bean landraces have been carefully maintained by local communities for different reasons, such as, disease resistance, drought tolerance, early maturity, high yields, resistance to pests, cooking characteristics, flavour, taste, etc. The Bunda College research has shown that women in particular are able to identify and name all the varieties they grow in complex mixtures. They can also describe the plant growing habits and classify the beans using colour, shape, size and other characteristics much like scientific nomenclature. This knowledge base is being used in a "Component Breeding" strategy.

5.2.4 Indigenous Technical Knowledge

Studies have shown that small-holder farmers in Malawi are able to name more than 50 indigenous tree species, explain why certain tree species are retained, tolerated, or managed in their gardens, giving reasons like for soil improvement, fodder, nutrition, medicine, fuelwood, building, timber etc., and they are able to prioritise which particular indigenous fruit trees they would prefer to plant. It is clear that they were able to distinguish accurately between closely related species of plants, give them different local names, and were well versed with the phenology of the trees.

The farmers knew which tree species to use for live fencing using truncheons for both their gardens and bath shelters, or which trees gave root suckers from which they collected saplings, or which trees could be managed by coppicing. They knew which tree species are also known locally to conserve water.

A well-documented indigenous plant *Faidherbia albida* (**msangu**) is a tree which grows profusely in alluvial soils. It sheds its leaves during the rainy season, but retains them during the dry season. Crops grown under its canopy are not shaded from sunlight, while benefiting from the nitrogen released from the decomposing leaves. Farmers realise the agricultural importance of this tree and do not cut it unnecessarily. They take it as fertilizer growing in their fields. One of the many examples of indigenous technical knowledge about this tree is that given by Chimutu (1995) who learned in a study at Ntonda, Ntcheu District,

that when farmers want to grow or propagate the **msangu** tree, they would take cattle dung (after the cattle had fed on **msangu** pods) and place the dung where they wanted the trees to grow. The seeds readily germinated because they got scarified as they passed through the cattle gut. Scientifically, scarification is normally given as a treatment to induce germination of these legumes because they largely fail to germinate if not scarified. Many other plant species are traditionally known to have various characteristics and are exploited for purposes such as pesticides, termiticides, poisons, postharvest storage etc.

5.2.5 Traditional Knowledge Concerning Health

Much more detailed traditional ecological knowledge of medicinal plants has accumulated as a result of the fight by humans against disease, for the benefit of both humans and livestock. There has always been knowledge of plants with medicinal properties and claims made by herbalists on treatment of ailments is not all to be brushed aside. In western medicine, some 20% of drugs are still directly derived from plants which form the primary source in traditional medicine. Ethnomedical practitioners, variously categorised as traditional healers, herbalists, traditional birth attendants (TBAs) etc, provide a most wide-spread form of health care in Africa, and in some cases, registered successes derive from an understanding of IKS, for example, in psychosocial and cultural illnesses. With such a wide range of benefits accrued from trees, shrubs and herbs, it comes as no surprise that a code of conduct was evolved regarding sustainable harvesting of plant and animal products used for medicines. For example, the herbalist is supposed to remove bark from one side of the trunk only (apparently to avoid ring-barking the tree); or remove only roots of a certain size, but not the tap root in any case, etc. However, once certain herbalists became more prone to profit making, such IKS broke down thus causing overexploitation and threat to biodiversity.

Programmes to domesticate medicinal plants as a conservation measure and to locally supply raw materials for primary health care have been effected. The following is a quotation from a World Health Publication: “There is ... much in favour of establishing programmes for producing standardised and safe galenical traditional preparations for potential use in primary health care, with the eventual aim of discovering their active principles. Even if the active principles have not yet been identified in some plants used in Traditional Medicine historical evidence of the value of such plants could result in useful preparations provided they are safe”.

5.3 **External pressures which disrupt the passing on of traditional values and skills**

Traditional ecological knowledge and values about native plants and animals used to be passed on by word of mouth when children spent much time with elders. Nowadays, children spend more time in schools, in transit to and from schools and in front of the television in urban areas. Urbanisation itself greatly contributes to the erosion of IK while the generation of the more competent elders with a store of such knowledge is fast disappearing as they age and die, without good replacements. It is becoming more apparent that many parents are abandoning traditional subsistence activities to seek jobs

elsewhere. This denies the parents adequate time to teach the children their language, customs and skills. The children themselves do not spend enough time with nature, whether alone or with peers. The less exposure means that there is a limited range of activities upon which their cultures' traditional sense of place was formerly based. As the children learnt from the elders through hands-on experiences, a specialised vocabulary was passed on to them, but reduced activities in this area has resulted in the erosion of linguistically encoded traditional knowledge about places. Perhaps Malawi, with 85% of the population still rural (compared with 50% in South Africa) could capitalise on a considerable amount of traditional knowledge.

VII INTERVENTIONS: TOWARDS A NATIONAL ACTION PROGRAMME TO COMBAT DESERTIFICATION

The National Action Programme will be formulated according to the themes examined above, as redefined, below. In addition, two more themes (Institutional arrangements and Funding arrangements), as discussed at the national forum, have been included:

- a) Environment Management
- b) Food Security
- c) Water Resources Management and Development
- d) Renewable Energy
- e) Deforestation
- f) Indigenous Knowledge Systems and Technologies
- g) Institutional Arrangements
- h) Funding Arrangements

1. Overall Strategy of the National Programme

Consistent with article 10 of CCD and article 8 of Annex 1 (Regional Implementation Annex for Africa), the overall strategy of the national action programme shall:

- emphasize integrated local development programmes for affected areas, based on participatory mechanisms and on integration of strategies for poverty eradication into efforts to combat desertification and mitigate the effects of drought;
- aim at strengthening the capacity of local authorities and ensuring the active involvement of local populations, communities and groups, with emphasis on education and training, mobilization of non-governmental organisations with proven expertise and strengthening of decentralised government structures.

2. Measures to be Taken in the National Action Programme

- Measures to improve the economic environment with a view to eradicating poverty;
- Measures to conserve natural resources;

- Measures to improve institutional organization;
- Measures to improve knowledge of desertification;
- Measures to monitor and assess the effects of drought.

The following are some of the interventions formulated during the process of identification of the issues pertaining to the CCD, involving visits of task forces to districts followed by a national forum held from 1-3 November 1999:

3. Goal of the CCD.

The goal of the country programme on CCD is to combat desertification and mitigate the effects of drought.

4. ENVIRONMENT MANAGEMENT

4.0 Overall Objective

The Government and communities should ensure that there is a suitable and safe environment for one to live in through government departments and community based management groups, i.e. Village Natural Resources Management Committees (VNRMC).

4.1 Broad Areas of Intervention

The following are action plans that can be carried out or promoted at central government level:

1. Diversify Malawi's economy from over dependence on agricultural production and raise the contribution of other sectors in the economy.
2. Increase smallholder agricultural productivity, as one of the measures to reduce poverty – this will greatly assist in the conservation and protection of natural resources and environment.
3. Reduce demand for fuelwood by improving the energy efficiency of traditional cooking and by introducing economically alternative sources of energy to fuelwood.
4. Promote community based forest/natural resource management activities and promote alternative sources of income activities for the people that engage in exploiting natural resources like selling wood.
5. Address major problems of unsuitable agricultural practices and emphasize community awareness of the importance of the catchment protection to enhance availability of water in the country's rivers.
6. Promote the use of environmental impact assessments to design a larger number of projects, sector programs, and adjustment operations so as to select best alternative in terms of environmental impact and sustainable

development. A special effort should be made to develop assessment capacity in the field and strengthen popular participation.

7. Put in place appropriate policies regarding concession and pricing of wood, including stumpage fees.
8. Define proper policies for managing natural resources and implement them at national level - this includes coming up with subsidiary legislation for the legislation already in place.
9. Strengthen the Environmental Affairs Department as the Environmental Coordinating Agency in Malawi to enable it address effectively issues of land degradation, desertification control and drought management.
10. Identify and strengthen existing institutions to increase their capacity to conduct training and other relevant activities.
11. Those stakeholders opening hotel industries along Lake Malawi and Shire river should be producing plans which are friendly to the environment before construction work is effected.
12. Those opening any mining projects should be producing plans which are environmentally friendly to avoid pollution and destroying the natural resources around the area where the project is effected.
13. Rubbish disposal should be provided even in the villages.
14. Promote uniform construction of pit latrines with San Plat sanitation to reduce waterborne diseases and train entrepreneurs.
15. Government projects, including MASAF projects, should produce environmentally friendly plans before effecting any construction projects, and should include rehabilitation work after completion of the project, such as filling of gravel pits and reforestation. Agreement forms should be signed by both the communities and project implementers, including compensation to the communities where the environment has been destroyed as a result of human error.

4.2 Community Based Interventions

The following are the action plans that can be carried out by communities. These have also incorporated the suggested action plan that were proposed during the sensitization meetings.

4.2.1 Reduction of high rate of population growth

1. Promote community based family planning method dissemination.
2. Promote EIC on effects of high population on the economy through sensitisation meetings.
3. Discourage early marriages and teen pregnancies
4. Promote vasectomy to men
5. Polygamy should be disallowed and people should be advised to stop having children outside marriages.
6. Establish law limiting the number of children in the family and empower women to decide on how many children the family should have.

4.2.2 Reduction of poverty through provision of alternative sources of income.

1. Provision of loans through CBOs for IGAs.
2. Train communities in vocational employment skills.
3. Promote ENRM based IGAs eg. bee keeping.
4. Provide training on a demand driven basis to community groups and/or individuals on ENRM based IGAs.
5. Develop and facilitate access to resources for ENRM based IGAs.
6. Encourage investors to open up businesses in dryland areas.

4.2.3 Management of Communal Forestry resources and wood lots.

1. Promote production of multipurpose trees on farm plots.
2. Improve markets for wood products.
3. Promote development of school clubs through tree planting programmes.
4. Promote the establishment of community wood lots and private plantations.
5. Promote tree farming among communities for their own use and profit.
6. Promote local collection of tree seed and train people on how they identify best sample trees for seed collection.
7. Train people that they can also use truncheons when they want to plant some tree species.

4.2.4 Soil conservation strategies for crop lands and adjacent lands

1. Promote awareness in soil conservation at community level mainly through existing social organizations
2. Promote biological conservation measures through promotion of rotational grazing
3. Promote establishment of perennial crops for better vegetation cover of soil
4. Develop schemes for the establishment of vegetative cover in schools, church yards, river banks, market places and the commons in general.
5. Promote improved farming methods that accommodate soil and water conservation.
6. Train village headmen on land allocation systems to avoid allocating land on very steep slopes for cultivation but allocate it for tree regeneration/tree planting.
7. Inform village headmen to enforce the requirement that six metres or above should be left undisturbed to protect the riverbank from erosion.

4.2.5 Biodiversity Conservation: Plant and animal conservation strategies in protected and outside protected areas established

1. Encourage, develop and support all appropriate initiatives for local people participation (communal and individual) in wildlife and environment management and utilization.
2. Integrate wildlife conservation entirely with environmental conservation by establishment of protected woodlands, aquatic systems and other habitats, as community owned conservation areas.
3. Promote the creation of wildlife sanctuaries including churchyards.

4. Establish a more effective wildlife-use system that combines wildlife conservation with pastoralism.
 5. Return the powers of Chiefs, such as traditional courts under Traditional Authorities as they used to be, to provide legal mandate for chiefs to try cases on natural resources management.
5. FOOD SECURITY

5.0 Overall Objectives

1. To provide irrigation services to farm families or groups e.g. schemes, with improved/ appropriate technology, crop diversification for increased crop production.
2. To rehabilitate existing schemes so that they are brought back to their old productive status.
3. To review policy affecting operations of schemes/ institutions.
4. To create pilot areas in upland areas emphasising agroforestry and natural resources management for high crop production.

The following (underlined) issues were identified and actions are suggested.

5.1 Increased levels of soil erosion resulting in barren lands being left for crop production

1. Provide adequate and appropriate extension service to natural resource management.
2. Government staff in the rural areas should be answerable to the communities in which they work.
3. Research into appropriate technologies.
4. Land management programmes must be seen to be part of a farming system.

5.2 Inappropriate farming practices which result in reduced crop yields, increased vulnerability to land degradation, and inefficient use of the land.

1. Strengthen implementation of recommended farming practices i.e. contour ridging, agro-forestry, use of vetiver hedgerows, application of organic and inorganic manure.
2. Introduce modern farming techniques such as animal and tractor drawn implements, including hire schemes.
3. Deep tillage.

5.3 Chronic poverty, with no propensity to invest in land improvements

1. Intensify agro-forestry systems especially in hilly and dry areas.
2. Introduce other income generating activities.
3. Population policies geared towards family planning so that the few resources that are available can satisfy the population.

5.4 Soil fertility decline, resulting in stunted crop growth

1. Strengthen campaigns for crop rotation, mixed cropping, application of organic manure.

5.5 Adverse weather conditions, resulting in poor crop performance

1. Breed for drought resistant crops.
2. Create new schemes for irrigated agriculture and target farm families.
3. Rehabilitate old agriculture schemes - their current poor state is due to poor policies and negligence.

5.6 High population growth, resulting in high pressure exerted on natural resources, causing shortage of supplies

1. Implement sound population control policies and disseminate information on family planning, both modern and effective traditional methods.
2. Shift dependence away from natural resources.

5.7 Inadequate access to information, causing limited technology transfer

1. Reduce farmer-staff ratio by increased training of staff, such as through re-opening of the Natural Resources College.
2. Re-introduce the training of farmers.

5.8 Limited policing capabilities by Government, resulting into non-compliance to lease covenants, and development of a slaughter harvest spirit on the part of most estate owners

1. Train lessees to be more responsible.
2. Employ more land inspectors.
3. Toughen penalties on offenders.

5.9 Declining holding sizes, with inadequate food production

1. Intensification of operations.
2. Introduce hydroponics.

5.10 Weak levels of crop diversification: dependence on one crop for food and cash (maize and tobacco, respectively)

1. Introduce new suitable crops such as paprika, macadamia.

5.11 Inadequate sources of income generation with the result that natural resources (trees) have become a major source for generating income

1. Intensification of tree planting.
2. Devolving powers to local communities to ensure more effective control.
3. Develop a spirit of creativity amongst the communities so that other avenues for generating incomes can be identified.

6. WATER RESOURCES MANAGEMENT AND DEVELOPMENT

6.0 Overall Objective

To improve supply and sanitation of water

6.1 Strategies to Manage Drinking Water Supplies

The following strategies and management policies should be implemented to solve the problem of desertification and consequently water resource degradation and depletion in Malawi.

1. Implement catchment management measures such as agroforestry and appropriate land husbandry techniques, such as land conservation practices to impede run-off.
2. Identify remedial measures to rehabilitate the affected catchments i.e. afforestation, revegetation, filling up of gullies, development of protective works or soil conservation measures such as contour bands etc, prevention of encroachment into the rehabilitated areas.
3. Encourage farmers to use organic manure, and adopt proper methods of application of fertiliser and pesticides.
4. Promote researched measures of integrated pest management.
5. Enforce legislation on handling and safety of pesticides.
6. Develop environmental messages and conduct public awareness campaigns to educate the public through radio, newspapers, and posters against cultivation along river banks or steep slopes or other marginal lands which are likely to cause environmental degradation.
7. Provide basic water and sanitation services to those communities which have undertaken to contribute towards the capital cost of their facilities such as drilling more boreholes for the communities and using the available surface water resources such as Lake Malawi as gravity fed sources of drinking water supply schemes.
8. Promote cost-effective technologies and approaches (such as handpumps, dugwells and upgrading of traditional water sources and sanitation services) that offer hope to all especially women and children who are highly affected.
9. Ensure sustainability of natural resources and other facilities through community ownership and management, community decision-making in their design and active involvement of women at all stages of individual projects.

For example, a sense of ownership is fostered by sensitising the community and promoting self-determination, self-reliance and self-help spirit through the formation, training and supervision of a structure of committees.

10. Protect catchment areas from encroachment by improved agricultural production activities and settlements through enforcement of existing laws, and imposing much heavier fines for forestry offenses as a deterrent.
11. Review and revise the current legislation in water resources management so that it matches and acts in accordance with the present water resources management and sanitation regulations.
12. Promote effective and sustainable delivery of improved water supply and sanitation facilities through Government, non-governmental organizations and private sector provision of goods and services, and public sector promotion and support.
13. Promote water harvesting technologies at household level and water conveyance.
14. Harmonise fragmented policies and acts.
15. Strengthen partnerships between stakeholders.
16. Review the current government structure to conform to an appropriate structure for community based natural resources participation.
17. Harmonise the existing extension systems between ministries of agriculture, forestry, fisheries and water.
18. Introduce a water levy on water providers and pass on the levy to the Forestry Department.
19. Encourage packaging and selling of water from springs as an income generating activity.

7. RENEWABLE ENERGY

7.0 Overall Objective

To diversify energy sources

7.1 Strategic options for mitigating people's overdependence on woodfuel for energy and income

There are several strategies that could be pursued in order to mitigate the problems of overdependence on woodfuel for energy and income in Malawi. Among them are the following:

1. At present only 4% of the country's population has access to commercial clean energy services. There is need to change this and increase access to more than 10% within the next 10 years by:
 - 1.1 Promoting rural electrification through grid and no grid options;
 - 1.2 Encouraging the local manufacturing of energy related appropriate technologies;
 - 1.3 Establishing a revolving fund for renewable energy loans and allow the poor to access the loans for purchasing solar home systems and connecting electricity to their homes;
2. Promote energy-related income generating activities such as biomass briquetting so that people who are dependent on woodfuel as a source of income are provided with alternative sources of income and energy.
3. Improve efficiency in production and use of energy resources through the promotion of efficient charcoal production technologies and promotion of improved cook stoves at household level.
4. Introduce sustainable charcoal production systems by commercializing pine charcoal production from plantations in the country. This would help to relocate people who are currently producing charcoal unsustainably from customary land forests to plantation forests where they could also be taught how to reforest areas from which they have cut down trees.
5. Provide concessionary funding for community power producers and provide incentives in form of duty and surtax exemption on equipment and end use devices that use electricity and other renewables such as solar and biogas energy.
6. Introduce low cost technologies for electrical wiring such as prewired boards, prepaid meters and load limiters. At the same time put in place arrangements for hire purchase systems.
7. Review policies that relate to capital contribution on grid connections and remove it completely.
8. Build the necessary capacities and institutional structures for managing alternative sources of energy to wood fuels through training professionals in the energy sector and training technicians and artisans who will install and maintain the new technologies.

9. Increase funding for the promotion of renewable energy technologies so that this source of energy plays a significant role in the country's energy mix.
10. Promote biogas technology.
11. Subsidize the cost of cookers and reduce tariffs on electricity.
12. Introduce appliances that use non-wood products e.g. coal stoves.

8. DEFORESTATION

8.0 Overall Objectives

1. To improve land productivity
2. To instill sense of ownership in the people through participatory management
3. To restore powers of traditional authorities to manage forests.

8.1 Framework for Solutions

1. Build local capacity to manage natural resources - the Forestry Department should retain local staff to be supported by chiefs, village headmen and ward councilors.
2. Introduce or improve vegetable production in some areas, especially those close to city markets. These include Likoma/Chizumulu Islands and Usisya, Salima, Blantyre (Mdeka), Mwanza and Chikwawa. There is also an opportunity to start projects in extraction of edible oils from *M. oleifera*, neem and palm fruits.
3. Promote fruit juice extraction from *A. digitata* (**Malambe**) growing in North Mzimba and Likoma Island, throughout the belt down to the Lower Shire. There is also scope for improving supply of palm leaves and bamboos in order to promote handicraft products.
4. Review the marketing structure with a view to improving the pricing distribution and promotion. There should be an environmental component in the price which can be ploughed back to either a Beach Village Committee or a Village Natural Resources Management committee.
5. Identify alternative sources of energy and technologies for smoking fish and domestic use. In this regard the role of windmills, solar panels, improved smoking furnaces, **maibawo** and paper briquettes cannot be over emphasised.

6. Protect fragile areas such as hillslopes and river banks in order to control avalanches and siltation and improve wood supply through afforestation and reforestation using most suited species, both indigenous and exotic species. All riverine areas need to be planted with trees and cultivation should be restricted to 50 meters away from the river banks. These conservation activities need to be planned and implemented jointly with specialists in biodiversity conservation and climate change. It is only through working together that meaningful synergy will be achieved among the Rio generation of conventions.
7. Discourage burnt bricks along the lakeshore and instead promote cement blocks.
8. Encourage planting of indigenous fruit trees.
9. Formulate district afforestation programmes with guidance from Forestry Department, and strengthen monitoring e.g. enforcement of the 10% forest cover for estates,

9. INDIGENOUS KNOWLEDGE SYTEMS AND TECHNOLOGIES

9.0 Overall Objective

To promote cultural values and heritage

9.1 Strategies and actions for Integrating Indigenous Knowledge into Programmes

1. The first step in the valuation and selective use of indigenous knowledge in conservation and other human activities is its recognition.
2. Document and evaluate, as a matter of urgency, the diverse range of indigenous knowledge that relates to biodiversity since people with such knowledge are the aged and are not being adequately replaced.
3. Employ rural experts in traditional practices, such as herbalists and folklorists, to convey their understanding of the importance of biodiversity to schools, communities, NGOs, government officials, and International agencies.
4. Develop, in collaboration with indigenous expertise, new sustainable systems of biodiversity conservation and biological resource management.
5. Assuming that programme planners understand the full range of fauna and flora that different indigenous groups use, the planners can better assist in the transfer of knowledge among the groups.

6. Local knowledge can be tapped as a shortcut to compiling an inventory of biological resources e.g.in soil and crop surveys.
7. Local knowledge can serve as a basis for environmental monitoring and as an early warning system of ecological changes, e.g through knowledge of indicator species.
8. Local observers can act as monitors of faunal and floral growth, distribution, and change.
9. Indigenous ideology can serve as a resource for conservation metaphors and practices. The North honors IK but dismisses indigenous beliefs as primitive or superstitious, yet many African conservation practices are unintelligible without reference to ideas that are labelled beliefs.
10. Incorporate indigenous knowledge in environmental education programmes in the school curriculum.

10. INSTITUTIONAL ARRANGEMENTS

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- **10.0 Overall Objective**
-
- To empower local communities
-
- **10.1 Expected outputs from this programme:**
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- 1. Extension system harmonised
-
- 2. Relevant policies to combating desertification harmonised
-
- 3. Community based organisations established and empowered
-
- 4. Traditional authority including courts restored
-
- 5. Women empowered on family planning
-
- 6. NAP Steering Committee strengthened
-
- 7. National funding mechanism established and operational.
-
-

11. FUNDING ARRANGEMENTS

-

- **11.0 Overall Objective**
-
- To enable programme implementation
-
- **11.1 Expected outputs from this programme:**
-
- 1. Levies on processed water introduced
 -
 - 2. Sectoral funds, Trust Fund and District Development Funds receiving and disbursing financial resources to support desertification programmes
- 2.1 Donors supporting desertification programmes
- 2.2 Subsidies and loans for desertification funds made available.

PART II

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National Action Programme

1. Food Security
2. Water Resources Management and Development
3. Renewable Energy
4. Deforestation
5. Environmental Management
6. Indigenous Knowledge Systems and Technologies
7. Institutional Arrangements
8. Funding Arrangements

NATIONAL ACTION PROGRAMME FOR MALAWI FOR THE UNITED NATIONS CONVENTION TO COMBAT DESERTIFICATION (CCD)

1. Introduction

Desertification is defined as land degradation in arid, semi-arid and dry-sub-humid areas resulting from adverse natural and/or human activities. The United Nations Conference on Environment and Development, UNCED (also called Earth Summit), held in Rio de Janeiro, Brazil, in June 1992, offered an opportunity for world leaders to consider international laws for managing natural resources and their processes, in a new, integrated approach to the problem emphasising action to promote sustainable development at the community level. One of the most significant agreements reached at Rio was the decision to elaborate an international Convention to Combat Desertification (CCD). This was one of the three conventions, the other two being the UN Convention on Biological Diversity (CBD) and the UN Framework Convention on Climate Change (UNFCCC).

The objective of CCD is to combat desertification and mitigate the effects of drought in countries experiencing serious drought and/or desertification, particularly in Africa, through effective action at all levels, supported by international cooperation and partnership arrangements, in the framework of an integrated approach which is consistent with Agenda 21, with a view to contributing to the achievement of sustainable development in affected areas.

The adoption in Paris on 17 June 1994 of CCD represented a major step in the response of the international community to the problems of drought and desertification. The convention entered into force on 26th December 1996. Malawi ratified the CCD on 13th June 1996 in recognition of almost 3 million hectares of semi-arid and dry sub-humid lands stretching the Rift Valley Floor from Karonga to Nsanje and some parts of Mzimba, Chiradzulu, Mwanza and the Phalombe Plain.

2. Overall Strategy of the National Action Programme

Consistent with article 10 of CCD and article 8 of Annex 1 (Regional Implementation Annex for Africa), the overall strategy of the national action programme shall:

- emphasize integrated local development programmes for affected areas, based on participatory mechanisms and on integration of strategies for poverty eradication into efforts to combat desertification and mitigate the effects of drought;
- aim at strengthening the capacity of local authorities and ensuring the active involvement of local populations, communities and groups, with emphasis on education and training, mobilization of non-governmental organisations with proven expertise and strengthening of decentralised government structures.

The CCD lays down seven general requirements for National Action Programmes:

- “incorporate long-term strategies..., emphasise implementation and be integrated with national policies for sustainable development;
- allow for modifications to be made in response to changing circumstances and be sufficiently flexible at the local level to cope with different socio-economic, biological and geo-physical conditions;
- give particular attention to the implementation of preventative measures for lands that are not yet degraded or which are only slightly degraded;
- enhance national climatological, meteorological and hydrological capabilities and the means to provide for drought early warning;
- promote policies and strengthen institutional frameworks which develop co-operation and co-ordination, and facilitate access, by local populations to appropriate information and technology;
- provide for effective participation at the local, national and regional levels...; and
- require regular review of, and progress reports on, their implementation.”

The Convention also lays down five voluntary elements:

- ◆ “the establishment and/or strengthening of early warning systems and of mechanisms for helping environmental refugees;
- ◆ the strengthening of preparedness for drought, and of the management of its impacts, at local, national, sub-regional and regional levels;
- ◆ the establishment and/or strengthening... of food security systems, including storage and marketing facilities, particularly in rural areas;
- ◆ the establishment of projects to develop alternative livelihoods that could provide incomes in drought prone areas; and
- ◆ the development of sustainable irrigation schemes for both crops and livestock”.

Finally, the Convention identifies priority fields for action and says that each affected country Party, depending on its circumstances, should include at least some of them in its National Action Programme:

- “promotion of alternative livelihoods and improvement of national economic environments with a view to strengthening programmes aimed at the eradication of poverty and at ensuring food security;
- demographic dynamics;
- sustainable management of natural resources;
- development and efficient use of various energy sources;
- institutional and legal frameworks;
- strengthening of capabilities for assessment and systematic observation, including hydrological and meteorological services; and
- capacity-building, education and public awareness”.

3. The NAP Preparatory Process in Malawi

Malawi conducted sensitization and consultative meetings in all the 26 districts between May and August 1999. These meetings were held with key members of the District Development Committees (DDC). The membership of the DDC included Line Ministries, Members of Parliament, Chiefs, NGOs, under the Chairmanship of the District Commissioner. Following these consultations, six experts wrote position papers to summarise the findings which were then presented at a one-day workshop (8 October 1999) of the NAP Steering Committee. The Committee shaped the findings into programme areas and asked one Committee member to produce a consolidated Issues Document. A National Forum consisting of representatives of the District Local Government Administration, Chiefs, Line Ministries, the University of Malawi, and NGOs was then convened from 1-3 November 1999 to discuss the Issues Document and set an agenda for drafting of the Action Programme. Following the drafting exercise by a member of the Committee, a stakeholders workshop consisting of the NAP Steering Committee and the National Council for the Environment was convened from 21-22 March 2000 to discuss and finalise the Draft National Action Programme.

4. Range of NAP Issues and their Relation to Existing Policies, Strategies and Programmes

Following her participation at the UNCED in Rio de Janeiro in June 1992, and in response to the agreements concluded at the Rio Conference, Malawi started developing the National Environmental Action Plan (NEAP) in late 1992. The NEAP was formally launched in December, 1994. The NEAP describes the environmental situation in Malawi and outlines a series of actions that should be taken in order to redress the aggravating degradation and bring the utilization of natural resources within sustainable limits. Nine key environmental issues were identified, namely: soil erosion, deforestation, water resources depletion and degradation, high population growth, depletion of fish stocks, threats to biodiversity, human habitat degradation, climate change, and air pollution. The process used to identify issues and the issues that have come up in the CCD consultations are similar to those from the NEAP. However, the activities identified for implementation of the CCD will be complimentary to the NEAP rather than a duplication since implementing sectors participated fully in the whole process of consultations. In addition, lessons have been learned from implementing NEAP. These have led to improved strategies for the implementation of CCD at the grass roots level. One of the strategies will be direct disbursement of funds to the communities for micro-projects.

5. Dryland Issues Arising from the Consultative Process

From the national consultative process, eight broad themes were identified. The following highlights major issues under each theme:

5.1 *Food Insecurity, seen as a result of:*

- 5.1.1 Weak levels of crop and food diversification: dependence on one crop for food and nutrition; and cash and economic growth (maize and tobacco, respectively)
- 5.1.2 Increased levels of soil erosion resulting in barren lands being left for crop production
- 5.1.3 Inappropriate farming practices that result in reduced crop yield, increased vulnerability to land degradation, and inefficient use of the land.
- 5.1.4 Chronic poverty, with no propensity to invest in land improvements
- 5.1.5 Soil fertility decline, resulting in stunted crop growth
- 5.1.6 Adverse weather conditions, resulting in poor crop performance
- 5.1.7 High population growth, resulting in high pressure exerted on natural resources, causing shortage of supplies
- 5.1.8 Inadequate access to information, causing limited technology transfer
- 5.1.9 Declining land holding sizes, with inadequate food production
- 5.1.10 Poorly focused extension system.

5.2 *Problems in Water Resources Management and Development, resulting from:*

5.2.1 Encroachment

Encroachment into marginal or catchment areas has led to flashy runoff that rapidly runs without sufficiently recharging the groundwater aquifers. Most of the boreholes or shallow wells are drying up in these areas due to poor groundwater recharge thereby reducing the water table. It is now common to see rivers from these areas drying up or experiencing dwindling flow even if it could be in normal years in terms of rainfall.

5.2.2 Water scarcity and droughts

Water resources are becoming inadequate and scarce to meet the demand due to increases in population. Climate change has resulted into increased seasonal variability in the run-off. This problem has basically arisen as a result of droughts, with the resultant unreliable seasonal flows. There are frequent occurrences of droughts that are initiated by the El Nino and Southern Oscillation (ENSO) phenomena. These have resulted in declining amounts of both surface and groundwater resources due to inadequate amounts of rainfall to replenish water resources.

5.2.3 Sedimentation (siltation)

Clearing of vegetation cover has eventually resulted in increased soil erosion and runoff resulting into increased siltation in rivers. Silt loads (sedimentation) in surface runoff from soil erosion lead to significant problems in down stream water quality, including increased suspended solids and turbidity, resulting in high water treatment costs and water flow problems. Since the majority of the people reside in the rural areas and depend on rivers for water supply, chances of drinking unclean water are very high. Also, the silted river courses and water reservoirs

tend to have reduced capacities and when it rains the banks may overflow, causing flooding as has always been the case in Shire River Valley and its major tributaries, or the water erodes the bank. Flooding in the dryland areas along the Rift Valley is one of the major natural disasters in Malawi. It is mainly an imported problem from the catchment areas higher up in the country.

5.2.4 Chemical contamination

With the increase in use of marginal land, and cultivation of protected areas, and loss of soil fertility, use of agrochemicals such as fertilizers, pesticides and insecticides become inevitable in order to achieve increased productivity. However, runoff of agrochemicals resulting from poor conservation measures may have a detrimental effect on the quality of the water resources such as rivers, streams, lakes, groundwater, etc.

5.2.5 Boreholes and Taps

Drilling of boreholes and construction of taps have been imposed on communities without building capacity to promote a sense of ownership and empowerment to manage the facilities and associated catchment areas. As a result, some boreholes and taps (up to 40%) get abandoned when the first breakdown occurs, or the water table has receded, thereby forcing the communities to drink unsafe, dirty water.

5.3 *Problems in Renewable Energy, as a result of:*

- 5.3.1 Low access to electricity due to restrictive distribution policies, high wiring costs and capital contribution requirements. At present only 4% of the country's population has access to commercial clean energy services. The rural areas are clearly at a disadvantage
- 5.3.2 Limited affordable alternative sources of energy to woodfuels
- 5.3.3 Limited utilization of some biomass materials of agricultural wastes
- 5.3.4 Low efficiency of biomass conversion technologies
- 5.3.5 Low efficiency of woodfuel end-use devices
- 5.3.6 Unsustainable use of woodfuels and other biomass resources leading to deforestation and land degradation
- 5.3.7 Limited affordability of electricity and end use devices
- 5.3.8 Lack of Community Power Producers
- 5.3.9 Lack of local manufacturing of end use devices and accessories.

5.4 *The problem of Deforestation. caused by:*

- 5.4.1 Agricultural expansion without improvement in productivity per unit area, in particular the growth of the estate sector and opening up of new gardens in customary land
- 5.4.2 Economic and development activities that require use of fuel wood to burn bricks for sale or for building school blocks

- 5.4.3 Wanton cutting of trees for tobacco curing, building tobacco sheds and smoking fish
- 5.4.4 Cutting down of trees for charcoal burning and for sale because of unemployment
- 5.4.5 Slash and burn method of agriculture.

5.5 *Problems of Environment Management, in light of:*

- 5.5.1 Bush fire problems that threaten soils and biodiversity
- 5.5.2 Waste management that is underdeveloped
- 5.5.3 Need to restore powers of Chiefs to try cases on natural resources management
- 5.5.4 Need to promote the use of Environmental Impact Assessment before projects are implemented

5.6 *Underutilisation of Indigenous Knowledge Systems and Technologies, due to:*

- 5.6.1 Lack of recognition of IKS in conservation and other human activities
- 5.6.2 Inadequate knowledge of the diverse range of indigenous knowledge
- 5.6.3 Lack of awareness that local knowledge can serve as a basis for environmental monitoring and as an early warning system of ecological changes, e.g through knowledge of indicator species.
- 5.6.4 Lack of awareness that local knowledge can be tapped as a shortcut to compiling an inventory of biological resources e.g.in soil and crop surveys..

5.7 *Weak Institutional Arrangements, reflected by:*

- 5.7.1 Extension system not harmonised
- 5.7.2 Women not adequately empowered in family planning
- 5.7.3 Relevant policies to combat desertification not harmonised
- 5.7.4 Need to strengthen the capacity of Environmental Affairs Department

5.8 *Funding Arrangements, requiring:*

- 5.8.1 Setting up a sustainable funding mechanism for CCD implementation

**NATIONAL ACTION PROGRAMME FOR MALAWI FOR THE IMPLEMENTATION OF THE UNITED NATIONS
CONVENTION TO COMBAT DESERTIFICATION**

**COUNTRY PROGRAMME GOAL: TO COMBAT DESERTIFICATION AND MITIGATE THE EFFECTS OF DROUGHT IN MALAWI
THROUGH EFFECTIVE ACTION AT ALL LEVELS**

PROG. COMP ONE-NTS	GOAL	OBJEC-TIVES	STRATEG-IES	ACTIVITIES	OUTPUTS	MEANS OF VARIFICA-TION	TARGET AREAS	KEY ACTORS	TIME-FRAME
1. Food Secur-ity	To improve and sustain food suffic-ieny	<ul style="list-style-type: none"> •To Increase production of food and cash crops and livestock products 	<ul style="list-style-type: none"> •Promote crop diversification •Provide irrigation services to farm families or groups •Promote crops according to ecological suitability •Promote livestock industry 	<ul style="list-style-type: none"> •Intensify use of crops other than maize •Construct small scale community dams; construct shallow wells and provide treddle pumps for irrigation 	<ul style="list-style-type: none"> •Number and types of crops increased •Hectarage under irrigation increased 	Reports, visits/ Biannual	Mangochi, Karonga, Dedza, Salima, Chikwawa Nsanje, Mzimba, Nkhata-Bay	MoAI, NGOs, MoNREA Private Sector	5 Years
				<ul style="list-style-type: none"> •Intensify growing of specific crops in a given agroecologica zone 	<ul style="list-style-type: none"> •Hectarage of area-specific crops increased •Eating habits changed 	Reports, visits/ Biannual			5 Years
				<ul style="list-style-type: none"> •Intensify raising of specific species of livestock in selected zones 	<ul style="list-style-type: none"> •Number of different livestock species increased 	Reports, visits/ Annual			5 Years
				<ul style="list-style-type: none"> •Review policy affecting agricultural production 	<ul style="list-style-type: none"> •Relevant policy reviewed 	Reports/ Biannual			5 Years

PROG. COMPONENTS	GOAL	OBJECTIVES	STRATEGIES	ACTIVITIES	OUTPUTS	MEANS OF VERIFICATION	TARGET AREAS	KEY ACTORS	TIME-FRAME
2. Water Resources Management and Development	To improve supply and sanitation of water	<ul style="list-style-type: none"> •To protect catchment areas from encroachment 	<ul style="list-style-type: none"> •Promote effectiveness of the legal framework 	<ul style="list-style-type: none"> •Avoid settlements by enforcement of existing laws and imposing much heavier fines. •Sensitise the Judiciary and Prosecutors •Gazette more areas considered to be catchments 	<ul style="list-style-type: none"> • Catchment encroachment reduced 	Surveys/ Annual	Salima Dedza Mangochi Karonga/ Chitipa Chikwawa	MoLH-PPS MoWD DDLGA MoNR-EA MoAI	5 Years
		<ul style="list-style-type: none"> •To manage and rehabilitate the affected catchments 	<ul style="list-style-type: none"> •Improve vegetation cover 	<ul style="list-style-type: none"> •Carry out agroforestry, afforestation, revegetation, filling up of gullies, development of protective works or soil conservation measures, such as contour bands. 	<ul style="list-style-type: none"> • Water catchment areas well managed • Rehabilitated area increased 	Reports from collaborating NGOs/ annual	Salima Dedza Mangochi Karonga/ Chitipa Chikwawa	MoNR – EA MoAI DDLGA MoHP	5 Years
		<ul style="list-style-type: none"> •To conduct public awareness campaigns 	<ul style="list-style-type: none"> •Sensitise the public through radio, field days and publications 	<ul style="list-style-type: none"> • Develop environmental messages to educate the public on causes of environmental degradation and remedial measures 	<ul style="list-style-type: none"> • Public awareness for soil and water conservation improved 	Surveys/ Bi-annual		MoNR-EA MoAI NGOs Media DoI	5 Years

PROG. COMPONENTS	GOAL	OBJECTIVES	STRATEGIES	ACTIVITIES	OUTPUTS	MEANS OF VERIFICATION	TARGET AREAS	KEY ACTORS	TIME-FRAME
Water Resources Management and Development (cont'd)	To improve supply and sanitation of water			<ul style="list-style-type: none"> • Encourage farmers to use organic manure, and adopt proper methods of application of fertiliser and pesticides. • Promote researched measures of integrated pest management. 	<ul style="list-style-type: none"> • More farmers adopting use of manure • Environmental pollution minimised 	Surveys/ Annual Surveys/ Annual		MoAI City Assemblies	5 Years
				<ul style="list-style-type: none"> • Enforce legislation on handling and safety of chemicals. 	<ul style="list-style-type: none"> • Safe use of chemicals improved 	Surveys/ annual		MoWD EAD	5 Years
		•To improve handling of dangerous chemicals							MoAI Drugs & Poisons Board MoWD EAD

PROG. COMPONENTS	GOAL	OBJECTIVES	STRATEGIES	ACTIVITIES	OUTPUTS	MEANS OF VERIFICATION	TARGET AREAS	KEY ACTORS	TIME-FRAME
Water Resources Management and Development (cont'd)	To improve supply and sanitation of water	<ul style="list-style-type: none"> •To encourage proper methods of waste disposal 	<ul style="list-style-type: none"> •Promote low-cost strategy 	<ul style="list-style-type: none"> • Make provision for rubbish disposal even in the villages. • Promote uniform construction of pit latrines with San Plat sanitation to reduce waterborne diseases • Train entrepreneurs in the production of San Plat latrine blocks 	<ul style="list-style-type: none"> • Households adopting better rubbish disposal increased • Households constructing pit latrines increased • Entrepreneurs trained to produce San Plats increased 	Surveys/ Annual		DDLGA MoHP, MoGYCS NGOs MoLH-PPS EAD	5 Years

PROG. COMPONENTS	GOAL	OBJECTIVES	STRATEGIES	ACTIVITIES	OUTPUTS	MEANS OF VERIFICATION	TARGET AREAS	KEY ACTORS	TIME-FRAME
Water Resources Management and Development (cont'd)	To improve supply and sanitation of water	<ul style="list-style-type: none"> •To increase coverage in provision of safe drinking water and sanitation to those communities which have undertaken to contribute towards the capital cost of their facilities 	<ul style="list-style-type: none"> • Promote cost-effective best available technologies and approaches 	<ul style="list-style-type: none"> • Drill more boreholes • Exploit available surface water resources • Install hand pumps • Dig shallow wells and upgrade traditional water sources and sanitation services, paying particular attention to cater for women and children who are highly affected. 	<ul style="list-style-type: none"> • Increased provision of basic water and sanitation services to communities • Number of cost-effective units increased 	Reports/ Annual	Salima Dedza Mangochi Karonga/ Chitipa Chikwawa	DDLGA MoHP NGOs MoWD Private Sector	5 Years
Water Resources Management and Development (cont'd)	To improve supply and sanitation of water	<ul style="list-style-type: none"> •To increase sources of safe drinking water •To increase sources of Income 		<ul style="list-style-type: none"> • Package water from springs and sell 	<ul style="list-style-type: none"> • Processing and marketing of spring water into mineral water expanded 	Licences issued/ Bi-annual		MBS MoWD Private Sector	5 Years

PROG. COMPO-NENTS	GOAL	OBJEC-TIVES	STRATEG-IES	ACTIVITIES	OUTPUTS	MEANS OF VARIFICA-TION	TARGET AREAS	KEY ACTORS	TIME-FRAME
Water Resources Management and Development (cont'd)	To improve supply and sanitation of water	•To increase water storage capacity at community and household levels	• Promote water harvesting & storage technologies	•Construct small dams at household and community levels	• Water harvesting technologies at farm and household levels expanded	Surveys/ Annual	Salima Dedza Mangochi Karonga/ Chitipa Chikwawa	MoWD MoAI Private Sector MIRTDC	5 Years
		•To update legislation relating to water resources management		• Review and revise the current legislation in water resources management so that it matches and acts in accordance with the present water resources management and sanitation regulations.	• Revised water resources management law	Reports/ Annual Gazette announcement		MoJ MoWD	5 Years
		•To strengthen partnerships between stakeholders		• Exchange information through effective networking	• Better coordination achieved among water providers/users	Reports/ Annual		MoWD MoAI MoNR- EA Water Boards	5 Years

PROG. COMPO-NENTS	GOAL	OBJECTIVES	ACTIVITIES	OUTPUTS	MEANS OF VARIFICA-TION	TARGET AREAS	KEY ACTORS	TIME-FRAME
3. Renewable Energy	To reverse over depend-ence on woodfuel for energy and income. To diversify energy sources	<ul style="list-style-type: none"> •To promote rural electrification •To reduce cost of appliances 	<ul style="list-style-type: none"> • Extend the grid and non grid distribution of electricity to rural areas • Encourage the local manufacturing of energy related appropriate technologies • Subsidise the cost of cooking and ironing appliances 	<ul style="list-style-type: none"> • Coverage in rural areas increased • Locally-based energy related appropriate technologies produced and working • Duty and surtax on end-use appliances reduced 	<p>Reports/ annual</p> <p>Reports/ Annual</p>	All districts	DoE ESCOM Private Sector MBS	5 Years
		<ul style="list-style-type: none"> •To empower the majority poor economically to have easy access to renewable energy 	<ul style="list-style-type: none"> • Establish a revolving fund • Lobby for reduction on electricity tariffs 	<ul style="list-style-type: none"> • Number of loans issued increased • Number of solar home systems purchased and installed increased • Number of homes connected to electricity increased 	Reports/ annual		DoE DDLGA MoF Com-mercial Banks	5 Years
		<ul style="list-style-type: none"> •To reduce dependence on woodfuel as a source of income 	<ul style="list-style-type: none"> • Promote energy-related income generating activities 	<ul style="list-style-type: none"> • Energy related IGAs introduced 	Reports/ annual		DoE Private Sector NGOs	5 Years

PROG. COMPO-NENTS	GOAL	OBJECTIVES	ACTIVITIES	OUTPUTS	MEANS OF VARIFICA-TION	TARGET AREAS	KEY ACTORS	TIME-FRAME
Renewable Energy (cont'd)	To reverse over dependence on woodfuel for energy and income. To diversify energy sources		<ul style="list-style-type: none"> • Introduce projects in extraction of edible oils and fruit juices. • Improve supply of palm leaves and bamboos to promote handicraft products. 	<ul style="list-style-type: none"> • Oil extraction as an IGA established • Juices from indigenous fruits and woven handicrafts produced and marketed 	Reports/Annual	Likoma/ Chizumulu Islands, North Mzimba Rift Valley Districts	MoAI DDLGA NABW SEDOM DEM-ATT FINCA	5 Years
		<ul style="list-style-type: none"> •To improve efficiency in production and use of energy resources 	<ul style="list-style-type: none"> • Promote efficient charcoal production technologies • Promote improved charcoal cook stoves at household level • Introduce appliances that use non-wood products 	<ul style="list-style-type: none"> • Efficient charcoal production methods adopted • Improved charcoal cook stoves increased • Coal stoves introduced 	Surveys/Annual	All Districts	DoE Private Sector NGOs	5 Years
		<ul style="list-style-type: none"> •To introduce sustainable charcoal production systems 	<ul style="list-style-type: none"> •Privatise commercial pine charcoal production • Train charcoal producers in reforestation activities 	<ul style="list-style-type: none"> • Number of pine charcoal producers increased • Hectarage of reforestation areas increased • Pressure on customary land 	Surveys/Annual		DoE DoF NGOs	5 Years

PROG. COMPO-NENTS	GOAL	OBJECTIVES	ACTIVITIES	OUTPUTS	MEANS OF VARIFICA-TION	TARGET AREAS	KEY ACTORS	TIME-FRAME
				forests reduced				
Renewable Energy (cont'd)	To reverse over dependence on woodfuel for energy and income. To diversify energy sources	•To increase the number of electricity providers	• Provide concessionary funding for community power producers	• Enterprises in energy distribution established and promoted	Surveys/ Annual		MoF DoE Com-mercial Banks Private Sector	5 Years
		•To enable more households afford electricity	• Introduce low cost technologies for electrical wiring such as prewired boards, prepaid meters and load limiters. • Arrange for hire purchase systems on end-use devises • Review the policy on capital contribution on grid connections and remove it completely	• Number of households using low cost technology increased • Capital contribution on national grid removed	Reports/ Annual	All Districts	ESCOM DoE Private Sector MoF OPC- DoSC	5 Years
		•To build capacity of institutions to manage alternative sources of energy	• Train professionals in the energy sector and train technicians and artisans in the energy sector	• Trained manpower for managing alternative energy sources increased	Reports/Annual		DoE UNIMA MEDI Mzuzu Univer- sity TEVET	5 Years

PROG. COMPO-NENTS	GOAL	OBJECTIVES	ACTIVITIES	OUTPUTS	MEANS OF VARIFICA-TION	TARGET AREAS	KEY ACTORS	TIME-FRAME
							PWD	
		<ul style="list-style-type: none"> •To diversify energy sources 	<ul style="list-style-type: none"> • Promote alternative sources of energy e.g.. biogas, solar, ethanol-based fuels 	<ul style="list-style-type: none"> • Number of alternative sources of energy increased 	Reports/ Annual		MIRTDC DoE	5 Years

PROG. COMPO-NENTS	GOAL	OBJECTIVES	ACTIVITIES	OUTPUTS	MEANS OF VARIFICA-TION	TARGET AREAS	KEY ACTORS	TIME-FRAME
4. Deforest-ation	To instill sense of ownership in people through participa-tory forest manage-ment	<ul style="list-style-type: none"> •To build local capacity to manage natural resources 	<ul style="list-style-type: none"> • Train local staff as well as communities on participatory forest management •Formulate district Afforestation programmes •Enforce 10% forest cover for estates 	<ul style="list-style-type: none"> • Co-management of forest resources by communities and government introduced and working •Forestry education and campaigns at district level introduced and working •Forestry policy and laws enforced 	Reports/ Annual	Mangochi Machinga Chikwawa Mwanza Nkhotakota	DoF MoAI NGOs DDLGA	5 Years
		<ul style="list-style-type: none"> •To promote sustainable community based forest/natural resource management 	<ul style="list-style-type: none"> • Promote alternative sources of income generating activities • Promote growing of multipurpose trees on 	<ul style="list-style-type: none"> • Alternative IGAs introduced to take off the pressure on natural resources • Number of established Village 	Reports/ Annual		DoF NGOs WSM Other NGOs	5 Years

PROG. COMPONENTS	GOAL	OBJECTIVES	ACTIVITIES	OUTPUTS	MEANS OF VERIFICATION	TARGET AREAS	KEY ACTORS	TIME-FRAME
			private farm plots and community woodlots <ul style="list-style-type: none"> • Promote the establishment of community wood lots and private plantations. • Promote development of school clubs through tree planting programmes. • Intensify planting of indigenous fruit trees 	Forest nurseries increased <ul style="list-style-type: none"> • Area planted to wood lots increased • Village Forest Areas increased • Number of nature school clubs increased • Raising of indigenous fruits in Village Forest nurseries promoted 				
Deforestation (cont'd)	To instill sense of ownership in people through participatory forest management	•To encourage production and marketing of trees	<ul style="list-style-type: none"> • Improve markets for wood products • Review marketing policies to include an environmental component 	<ul style="list-style-type: none"> • Marketing infrastructure for wood products improved • Economic value of natural resources established 	Surveys and Reports/ Annual Gazette announcement	Mangochi Machinga Chikwawa Mwanza Nkhotakota	DoF Private Sector	5 Years
		•To increase knowledge of communities in propagation techniques	<ul style="list-style-type: none"> • Train local people in collection of tree seed and identification of best sample trees • Train local people to use truncheons to grow some tree species 	<ul style="list-style-type: none"> • Trained community's seed collectors increased • Knowledge of vegetative propagation of trees widespread in 	Surveys/ Annual		DoF Private Sector NHBGM ICRAF MoAI NGOs	5 Years

PROG. COMPONENTS	GOAL	OBJECTIVES	ACTIVITIES	OUTPUTS	MEANS OF VERIFICATION	TARGET AREAS	KEY ACTORS	TIME-FRAME
				community				
Deforestation (cont'd)	To instill sense of ownership in people through participatory forest management	<ul style="list-style-type: none"> To protect fragile areas such as hillslopes and river banks in order to control avalanches and siltation and improve wood supply 	<ul style="list-style-type: none"> Carry out afforestation using most suited species, both indigenous and exotic 	<ul style="list-style-type: none"> Tree seed banks established at village level Biodiversity on farm improved Tree cover in the landscape improved 	Surveys/ Annual		DoF NGOs NHBGM	5 Years
		<ul style="list-style-type: none"> To reduce use of woodfuel in small-scale industry 	<ul style="list-style-type: none"> Discourage burnt bricks along the lakeshore and instead promote cement blocks. Identify and promote suitable alternative sources of energy and technologies for smoking fish and domestic use such as windmills, solar panels, improved smoking furnaces, maibawo (solar cookers) and paper briquettes 	<ul style="list-style-type: none"> Appropriate building technologies and energy saving practices adopted Alternative sources of energy for smoking fish developed and adopted 	Surveys/ Annual	Mangochi Machinga Chikwawa Mwanza Nkhotakota	DoF DoE MoLH-PPS DoF	5 Years

PROG. COMPONENTS	GOAL	OBJECTIVES	ACTIVITIES	OUTPUTS	MEANS OF VERIFICATION	TARGET AREAS	KEY ACTORS	TIME-FRAME
5 Environmental Management	To ensure suitable safe and clean environment	<ul style="list-style-type: none"> • To diversify and raise contribution of other sectors to the economy other than agriculture 	<ul style="list-style-type: none"> •Identify and encourage private sector investment. •Train communities in vocational and employment skills •Encourage investors to open businesses in dry land areas. 	<ul style="list-style-type: none"> •Industrial base widened and entrepreneurship promoted •Over dependency on agriculture reduced 	<ul style="list-style-type: none"> •Reports on No. and types of investments •.Reports on No. of people provided with loans •No of people trained •Reports on No. and types of businesses in dry lands 	Country wide Dry lands	MIPA, MoTCI Malawi Chamber of Commerce, MoGYCS NGOs.	5 Years
		<ul style="list-style-type: none"> •To ensure that EIAs are carried out before project implementation. 	<ul style="list-style-type: none"> •Train EIA specialists •Enforce EIA regulations •Monitor the implementation of EIA recommendations 	<ul style="list-style-type: none"> •Environmental friendly plans produced and implemented. 	<ul style="list-style-type: none"> •Reports on No. of EIA Specialists trained. •EIA reports for projects. •Environmental Audit reports. 	Country wide	EAD, NCE and other stakeholders such as MIPA MoWD City Assemblies	5 Years
		<ul style="list-style-type: none"> •To promote sustainable waste management in the urban and rural areas. 	<ul style="list-style-type: none"> •Conduct public awareness on appropriate waste disposal. •Train communities in waste recycling. 	<ul style="list-style-type: none"> •Clean environment 	<ul style="list-style-type: none"> •Awareness reports on waste disposal. •Training reports on waste recycling and 	Country wide. Dry lands.	EAD, City & Districts and Town Assemblies.	5 Years

PROG. COMPO-NENTS	GOAL	OBJECTIVES	ACTIVITIES	OUTPUTS	MEANS OF VARIFICA-TION	TARGET AREAS	KEY ACTORS	TIME-FRAME
			<ul style="list-style-type: none"> •Promote waste management based IGAs. •Enforce city bye-laws and environmental management 		waste management based IGAs.			
Environ-mental Manage-ment (cont'd)	To ensure suitable safe and clean environ-ment	<ul style="list-style-type: none"> •To promote Community-based Environment and natural resources activities. 	<ul style="list-style-type: none"> •Train communities in ENRM-IGAs •Provide loans for IGAs. •Assist the communities in identifying markets. 	<ul style="list-style-type: none"> •Communities economically empowered. •Sustainable ENRM achieved. 	<ul style="list-style-type: none"> •Report on No. of people trained in IGAs & ENRM. •Report on No. of IGAs. •Report on No. of viable markets. 	Country wide	EAD NGOs MoGYCS SEDOM DEMATT NABW	5 Years
		<ul style="list-style-type: none"> •To develop and implement appropriate policies regarding concession and pricing of wood; and management of natural resources. 	<ul style="list-style-type: none"> •Organise meetings to debate on the existing policies. •Review the policies. 	<ul style="list-style-type: none"> •Policies in place and implemented. 	<ul style="list-style-type: none"> •Policy documents •Policy Implementation reports. 	Country wide	Forestry Dept., EAD Other stake-holders NEC	5 Years
		<ul style="list-style-type: none"> •To strengthen the capacity of EAD as environmental 	<ul style="list-style-type: none"> •Train Officers in ENRM. •Establish and upgrade more posts. 	<ul style="list-style-type: none"> •ENRM activities effectively coordinated and implemented. 	<ul style="list-style-type: none"> •Reports on No. of Officers trained and No. of posts 	Country wide	EAD other stake-holders	5 Years

PROG. COMPO-NENTS	GOAL	OBJECTIVES	ACTIVITIES	OUTPUTS	MEANS OF VARIFICA-TION	TARGET AREAS	KEY ACTORS	TIME-FRAME
		coordination agency and other existing institutions to effectively address degradation, desertification control and drought management.			established. •Reports on effective coordination and implementation.			
Environ-mental Manage-ment (cont'd)	To ensure suitable safe and clean environ-ment	<ul style="list-style-type: none"> •To develop and support all appropriate initiatives for community participation in environment and natural resources management. 	<ul style="list-style-type: none"> •Identify and develop appropriate initiatives for ENRM. •Train Communities in appropriate initiatives for ENRM. •Provide necessary resources to the communities . •Encourage already existing appropriate community initiatives. 	<ul style="list-style-type: none"> •Effective and sustainable ENRM by the communities achieved 	<ul style="list-style-type: none"> •Report on appropriate initiatives developed. •Training report on appropriate initiatives. •Report on types of resources provided. 	Country wide.	All stake-holders	5 Years

PROG. COMPO-NENTS	GOAL	OBJECTIVES	ACTIVITIES	OUTPUTS	MEANS OF VARIFICA-TION	TARGET AREAS	KEY ACTORS	TIME-FRAME
6. Indigenous Knowledge Systems and Technologies	To promote cultural values and harness the beneficial aspects of indigenous knowledge	•To identify and promote indigenous knowledge relevant to natural resources conservation	<ul style="list-style-type: none"> •Conduct comprehensive research on IKS •Create awareness on IKS •Evaluate and select IKS suitable for CCD •Utilise rural experts in traditional practices in training others •Develop, in collaboration with indigenous expertise, new suitable systems of biodiversity conservation 	<ul style="list-style-type: none"> •IKS identified and utilised •IKS promoted 	Reports, visits, demonstrations, observations/ Annual	Countrywide	All Ministries, UNIMA, NGOs, Private Sector	5 Years
			<ul style="list-style-type: none"> •Incorporate indigenous knowledge in environmental education programmes in the school curriculum 	IKS promoted	School curriculum	Countrywide	MoEST UNIMA	5 Years

PROG. COMPONENTS	GOAL	OBJECTIVES	ACTIVITIES	OUTPUTS	MEANS OF VERIFICATION	TARGET AREAS	KEY ACTORS	TIME-FRAME
7. Institutional Arrangements	To empower local communities	<ul style="list-style-type: none"> •To harmonise existing policies and legislation in order to promote community participation in natural resources management planning and decision making. 	<ul style="list-style-type: none"> •Organise meetings to debate on the existing policies •Review the policies 	<ul style="list-style-type: none"> •Policies in place and implemented 	<ul style="list-style-type: none"> •Harmonised policy documents 	Countrywide	All stakeholders	5 Years

PROG. COMPONENTS	GOAL	OBJECTIVES	ACTIVITIES	OUTPUTS	MEANS OF VERIFICATION	TARGET AREAS	KEY ACTORS	TIME-FRAME
8. Funding Arrangements	To obtain sustainable funding for CCD	<ul style="list-style-type: none"> •To identify sources of funding and set up a sustainable funding mechanism 	<ul style="list-style-type: none"> •Set up and assist sectoral funds, NDF Trust, DDF, and MEET 	<ul style="list-style-type: none"> •Sectoral funds, Trust funds and DDF established and operational 	Budget statement, Financial returns	Countrywide	MEET, MoF, DDLGA, MoNREA Private Sector	5 Years
			<ul style="list-style-type: none"> •Explore a range of fund raising mechanisms 	<ul style="list-style-type: none"> •Desertification activities funded 	Financial reports			
			<ul style="list-style-type: none"> •Involve donors in supporting desertification programmes 		Amount of donor funds pledged and funded			