District State of Environment Report for Pallisa District,

2004

INTRODUCTION

Pallisa District is located in Eastern Uganda, bordered by Kumi and Soroti Districts in the North, Tororo District in the South, Mbale District in the East, and Iganga and Kamuli Districts in the West. Physically the district lies between:

Latitudes 0^o 45' N and 1^o 05 'N, and longitudes 33^o47'E and 34^o05 'E

The district covers approximately a total area of 1564Km^2 and is made up of four (4) counties and twenty eight (28) sub-counties parishes 130. Of all these counties Pallisa is the largest with an area of 612.6Km^2 while Butebo is the Smallest with a land area of 304 sq.km

Out of the 1991-7 sq.kms, water bodies (open water and swamps) cover an area of 403.9 sq.km. This leaves 1587.8 sq. km for human settlement and related activities. The district has a total population capacity of 520532 and a population density of 228.7 persons/sq.km. The district lies at altitude between 910 and 1220 meters above sea level.

GEOLOGY AND SOILS

There are two main categories of geological formations in Pallisa district (Atlas of Uganda 1962) these include: -

- **Basement complex** (mainly undifferentiated acid gneiss), which covers much of the district, and Pleistocene to recent sediments in the northwest and southwest.

By and large, the whole of Pallisa District comprises of highly deformed metamorphised and granitized rocks of the organic complexes (the grandiosity gneiss and quartz-albeit gneiss of the Nyanzian-Kavirondian Complex): with much intrusive granite. Essentially these are wholly granitized or high to medium grade metamorphosed formations, comprising undifferentiated gneisse including elements of partly granitized and metamorphosed formations. These are basically Precambrian rocks (between 2400 and 2700 million years old).

The relief is generally characterized by plains at altitude ranging from 900-1200 metres above sea level (average of 1145 metres) Relative relief is low, seldom not more than 21 to 30 metres. In most cases the interfluves are broad flat or rounded and murram covered, and the valleys are wide. On the other hand, the two main geomorphologic features of the District are:

i **Areas of in-fill**: which are mainly found at the shores of the lakes and swamp such as Gogonyo, Mpologoma, and Namatala. The lakes include (Nyaguo, Nyasala, Gigati and Meito) to the west, northwest and south parts of the district.

ii Remnants of Lowland surface: constitutes the rest of the District and is largely characterized by open plains.

SOILS

The District soils are sandy and sandy loams of medium to low productivity. There are productive clay loams in the North and Northwest. Feralitic soils are normally formed where weathering and leaching process have reached their final stages. Often Kaolinites and quartz may be altered at these final stages. Although they are usually deep, friable and porous, their productivity is fair to moderate, depending on presence or amount of organic matter and amount of rainfall. Saturation of the exchange complex is usually below 40%; and besides, the soils normally have low reserve of minerals, thus, heavily depend on bases held in the clay and organic complexes for their fertility. Reddish-brown clay-loams and loams over laterite of medium productivity are also found in the district. There are also brown and gray sandy-loams mainly in valleys, which are of low productivity, and dark clays found in swamps.

The silt/clay ratio is generally less than 0.25 in the B and C-horizons, while the clays are predominantly of the 1:1 lattice type and is associated with large amounts of iron oxides present in the soil profile. Generally the heavier textured soils tend to be more fertile because they can withstand leaching effect than the sandy soil types. The productivity of soil types in this category is as outlined below: -

Soil developed on the Tanganyika surface and its dissected remnants

These soils are represented by the Buruli catena with the parent rock/material being the basement complex, gneiss and granites. They occur on undulating to gently undulating hills at an altitude between 1050-1259 meters above sea level. The dominant soils are reddish brown sandy loams and loams in laterite. They are very acidic with pH values below 5, deficient in available phosphorous and all the major exchangeable bases. In the district they are dominant in Puti –Puti and Bulangira Sub counties.

These soils are good for the growing of sorghum, millet, groundnuts, cassava, pigeon peas and cotton.

Soils developed on ancient lake sediments overlying the Tanganyika surfaces (Maizimasa Complex)

The Maizimasa complex of catens whose present rock/material in lake deposits derived from basement complex, granites, gneiss, etc represents soils in this family. They are the most dominant soils in the district covering nearly 2/3 of the total area. These soils are characterized by gray-brown and brown sandy loams over laterite. They are usually found on very smooth flat land at an altitude of between 1050-1350 maters above sea level There is no clear cut boundary from the Buruli catena but these soils cover most of central southern, and eastern parts of the district.

Hydromophic soils

The development and characteristics of these soils are influenced by permanent or seasonal water logging. Some of the soils have a high level of cation saturation and may be locally saline. In Pallisa they are of two characteristics:

1. **Soils developed on recent alluvia outside the rift valley**

   These are undifferentiated alluvium from river deposits as the parent rock/material and with black and gray clays often calcareous as the dominant soils. Sometimes these soils vary in colour from brown to blue-black and in texture from sandy clay to clay. Occasional iron concentrations may occur. The depth of the solum is very variable from a few feet to 30 feet. These exist adjacent to the Mpologoma wetland zone. They are of medium acidity to moderately alkaline in topsoil reaction while sub soils are usually neutral to moderate alkaline. They are useful for food crops as sorghum, finger millet and maize

2. **Alluvial soils influenced by papyrus**

   These soils are represented by the papyrus peat and have peaty sands and gray clays that are often calcareous as the dominant soils, which have developed from river (Mpologoma swamp complex) and in the northern part of the district within Gogonyo sub-county. They are within the catchments area of lake Kyoga, strongly acidic with a pH below 5

CLIMATE

The district experiences the equatorial type of climate with bi-modal types of rainfall increasing southwards 82% of the year is bi-modal but the climate is increasingly changing in the district with fluctuating climatic seasons.

RAINFALL

The average yearly rainfall is 900-1500 mm, increasing southwards to 1250-1400 mm; the rainfall is bi-modal with peaks in March-June and with a main dry season from December-February

Table 1: Mean monthly rainfall (1929-1970)

	Jan	Feb.	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Mean	19	45	90	190	192	116	126	145	111	91	76	41	1242
C.v (%)	141	104	75	41	32	51	44	54	52	60	80	106	16
>9: 10	0	0	4	89	101	40	54	45	37	21	0	0	984

Source: Meteorological Department

TEMPERATURE

Day and night temperatures reach their highest and lowest respectively in the dry season. The mean annual maximum temperature is about 32.5^0c and the mean annual temperature is about 15^0c

WIND

The wind that blows in the district is the southeast and northeast monsoon wind since it lies near the equator.

VEGETATION

The vegetation of the District is mainly savanna species. There are some forests and riparian vegetation. The savanna group includes mainly combretum associated with hypermedia in the South and Southwest, bytyro spermun associated with hypermedia sop in the centre and northeast, and mixed savanna in the northwest.

A forest in savanna mosaic associated with hypermedia exists in Budaka area. Riparian vegetation found in areas burdening the arms of Lake Kyoga are composed of aquatic grassland and herb swamp. Echinochloa grassland exists in valleys.

The District is generally environmentally degraded. There is only one forest reserve near Saala in Kinka Sub-county which had been encroached and turned into rice fields but apparently under restoration after NEMA's intervention in 2004.

DIVISION OF LABOUR AND ACCESSIBILITY TO RESOURCES

Being predominantly a rural District, 94.4% of the female are engaged in agriculture compared with 89.9% of their male counterparts. The rest are involved in other activities such as carpentry, service work provision etc.

Table 2: DISTRIBUTION OF ECONOMICALLY ACTIVE POPULATION BY SEX

Employment status	Male	Female	Total
Employed	3,560	808	4,369
Self-employed	42,970	9,885	52,769
Unpaid family workers	23,443	69,329	92,863
Total	69,979	80,022	150,001

Source: PALLISA DISTRICT PROFILE

Pallisa District is endowed with various resources from its natural environment. Unfortunately most of these resources are not fully developed.

THE ECONOMY, HOUSE HOLD INCOME AND ORGANIZATION

94.4% of the total household population in the District is engaged in agriculture, which provides an important source of household livelihood. Subsistence farming is mainly practiced and a negligible proportion (0.4%) is engaged in commercial farming. However production in this sector is generally declining due to unsustainable farming methods, inadequate land-use policy, plus increased population, and unreliable and unpredictable weather patterns. The population also heavily relies on informal petty trade though formal trading is gaining ground.

SOURCES OF INCOME

The main source of income in the district is agriculture. Generally the ability of the local authority to generate resources for development is very low. The income from agriculture is low because of its subsistence orientation. Non-farm activities are also increasingly providing income to the population.

The fact that the poverty situation in Pallisa District is still a glaring reality cannot be denied. However, to reduce the down ward spiral of worsening poverty and natural resources degradation, the District has wholesomely adopted and is implementing the two government programmes, for the poverty Eradication Action Plan (PEAP) and the Plan for Modernization of Agriculture (PMA). These Government interventions are meant to promote poverty alleviation, address redistribution of resources, reducing risks, tenure insecurities and strengthening education and public health. PEAP is a comprehensive development framework established on four major Pillars creating a framework for economic growth and transformation, ensuring good governance and security, directly increasing the ability of the poor to raise their incomes and directly increasing the quality of live of the poor (MFPED, 200).

It is envisaged that the full application of the corrective strategies in the PMA will go a long way to eradicate mass poverty and develop a competitive rural economy. In that light the PMA aims at: developing an efficient land market, thus ensuring an optimal utilization of land, strengthening research-extension of farmer linkages promoting efficient marketing transport and communication infrastructure, undertaking comprehensive rural electrification to create new economic opportunities, promoting the use of local materials and providing incentives for the private sector to invest in agriculture and agro-processing, and developing and promoting training programmes in business skills, farm management and project analysis and evaluation.

The implementation of the PMA programme in the district has been facilitated by other Government Programmes under the Local Government Development Programmes (LGDP), the Central Government Conditional Grants and other programmes assisted by the donor community. A variety of improved seeds have been introduced in the District under PMA. But inspite of the deployment

of Agricultural Extension Officers at the Sub-county level, many ordinary farmers have not adequately benefited from this development under the LGDP.

The feeder roads in the District have all been rehabilitated. Rural electrification, although still at a low level, is being implemented especially in the Sub-counties of Kibuku, Buseta, Tirinyi, Kakoro, and Gogonyo. An agricultural institution to impact the requisite skills for agricultural modernization has been established in Iki-Iki Sub-county. Through the assistance of an NGO **KULIKA** has been carrying out practical training in sustainable agriculture in the district.

Although poverty remains a glaring reality in the district, the full implementation of the PMA and PEAP plus other associated programmes will lead to sustainable development of the District. Environmental concerns have been streamlined in both the PMA and the PEAP programmes and investment projects. All projects under the PMA are supposed to carry out environmental impact assessment or reviews. Environmental checklists are to be developed to guide small investments like maize mills. All micro-credit loans are subjected to environmental eligibility as a condition. It is, therefore, not an understatement to optimistically mention that with the implementation of these sister programmes, there is light at the end of the tunnel. However a long distance outstands in sensitizing the beneficiary communities on the full implementation of these interventions to deal with risks caused by bad environmental management practices. The poor are more exposed to environmental damage because they cannot afford, for example, to purchase safe water or live in a neighborhood that is less polluted. Consequently the productivity of the poor diminishes and makes them susceptible to extreme metrological problems, (Mink 1993: WB 1992a).

The poor are both agents and victims of environmental degradation. Many soils in Pallisa district are severely degraded. Soil erosion accounts for a significant impact factor in the District.

The degradation and depletion of natural resources in Pallisa District has been attributed to population growth, unsustainable resource utilization, and increasing urbanization and to some extent industrial activities. The consequence of these phenomena has been pressure on the natural resources resulting directly into overgrazing and land fragmentation. Moreover the growing population has also impacted on the forest cover (because) owing to the fact that over 90% of the population use firewood and charcoal as a source of energy. The three stone fireplaces commonly used in the district contribute to indoor pollution and respiratory illness especially among women and children.
Poor agricultural yields due to degraded soils means that households must obtain an alternative source of livelihood. As most people in the district live in rural areas with virtually no alternative sources of income, they have resorted to charcoal production. Deforestation for charcoal production exposes the soils to agents of soil degradation.

Another poor coping mechanism for compensation for reductions in agricultural yields is the encroachment on ecologically sensitive areas like wetlands. In Pallisa District wetlands are both a source of food and income. It is worthy of note however that there is no noticeable improvement in the people's income inspite of their encroachment on the wetlands. Fish stocks have also declined significantly in the District and of course decreased fish harvest have a direct bearing on the livelihood of the local communities. These communities have resorted to using small sized nets, which leads to catching immature fish and other aquatic fauna thereby contributing to reduce fish stocks and loss of bio-diversity.

There is parity of data on the actual distribution of income and income per capita in the district. However in the rural areas where 91.2% of the population lives the income levels are relatively low due to the collapse of the cotton industry in the 1970s and 1980s. Although cotton growing has commenced in earnest, both the level of production and the price levels are low. A kilogram of cotton fluctuates between 300 shillings and 800 shillings on the average. The yield per farmer is generally low due to land fragmentation whereby smallholdings, which exist, use poor farming methods and low technology. Due to collapse of the traditional cash crop economic already alluded to the scarce food products have become major sources of income in the rural areas. These include rice, maize, millet, cassava, beans, peas, and groundnuts. etc.

The above not withstanding, the proportion are to the total population is still very low. For example according to the 1991 census, of the total population of 357,655 (as it then was only 150,001 were economically active and these were those aged 10years and above, thus yielding a crude activity rate of 41.9%. Out of the economically active, only (2.9%) were formally employed, 527,69 (35.2%) were self-employed, and the remaining 92,863 (4.9%) were unpaid family workers (UFW). This implies that 207,655(58.06%) were economically dependant. If the total population of the economical active 97.1% were engaged other directly in agriculture or agro-based activities and small-scale business transactions. This exerts a lot of pressure on the natural resources and increases the risk of environmental degradation

Table 4

TOTAL NUMBER OF BUSINESS BY SUB-COUNTY AND TYPE

COUNTY	S/COUNTY	TYPE/CATEGORY OF BUSINESS								
		Retail shop	Drug shop	Butcheries	Work shop	F/Stations	Liquor bars	Grinding mills	Produce buyers	Studios
Budaka	Budaka	52	8	2	2	1	5	6	3	1
	Iki-Iki	35	6	2	0	0	0	3	1	0
	Kaderuna	19	2	0	1	0	0	4	0	0
	Kamonkoli	26	2	0	0	0	1	4	0	1
	Lyama	5	0	0	0	0	0	0	0	0
	Naboa	14	1	1	0	0	1	3	2	0
Kibuku	Kibuku	33	6	2	*	0	2	13	X	0
	Bulangira	31	2	3	1	0	2	4	0	1
	Buseta	23	4	1	0	0	1	0	0	0
	Kadama	31	3	3	3	1	0	11	0	0
Butebo	Butebo	30	1	0	0	0	0	4	0	0
	Kabwangasi	37	2	3	0	0	0	2	4	0
	Kakoro	20	--	20	0	2	2	3	2	0
	Kibale	21	2	0	0	0	0	2	0	0
Pallisa	Agule	23	1	2	1	2	0	0	1	0
	Apopong	10	1	0	1	0	0	4	0	0
	Gogonyo	18	1	0	0	0	0	1	0	0
	Kameke	15	1	1	0	0	0	1	0	0
	Kasodo	13	0	0	0	0	0	0	0	0
	Pallisa	3	2	0	0	0	0	3	0	0
	Puti-Puti	15	1	0	0	0	0	5	0	0
TOTAL										

CHAPTER ONE

ENVIRONMENT AND DEVELOPMENT

INTRODUCTION:

Caring about the environment is not a luxury but a prime necessity because our economy as a district depends heavily on its capital of natural resources. This is even more true in the context of alleviating poverty because environmental degradation affects the poor in both urban areas and rural areas. Reversing the downward spiral of this degradation, therefore, is a key strategy to reduce poverty. Such a strategy requires every effort to maintain natural capital and to use it sustainably by promoting sound environmental management.

Towards the end of the Earth Summit in Rio in 1992, it became clear that without better environmental stewardship, development is likely to be undermined and without accelerated development in poor countries, environmental policies are certain to fail. It is in light of this predicament that the range of environmental issues is apparently perceived to be a major threat to human welfare in the District. The subject of environmental management and its integration into development planning has, therefore, become a major concern and challenge.

ECONOMIC GROWTH AND DEVELOPMENT IN PALLISA DISTRICT

There is a growing debate on how mankind is to integrate environmental management concerns with economic growth and social development in order to ensure a future for mankind.

In the 1950s and 1960s development was perceived as an economic process, which involves the trickling down of wealth to the general populace in order to improve human welfare (UNEP, 1999). However, the UNDP definition explores critical issues like gender inequality, growth, poverty, consumption patterns and calculates the human

development index base on life expectance, adult literacy, school enrolment and Gross Domestic Product per capita. (UNDP 1998a).

Development has further been defined as a process of progressive societal and economic transformation, the major objective of which is the satisfaction of human needs and aspirations, usually achieved by increasing productive potential and equality of opportunity (WCED 1987).

It should be noted however that economic development is not synonymous with economic growth. Economic growth is measured by rising Gross National product per capita but when economic development is taking place, a series of indicators improve over time. These include GNP per capita, reduction in income inequality, an improvement in adult literacy rates, reduction in illness (Morbidity) and mortality rates among adults.

On the other hand, the Earth Summit in Rio defined economic development, through its "Agenda 21" as a multifaceted process involving issues and requiring the participation of governments, international organizations and major groups (UNEP, 1999). The term "Sustainable development" was brought into common use by the World Commission on the Environment and Development (The Brundt Commission) in 1987. In trying to operationalise the concept of sustainable development, the concept of sustainable development, the World Banks approach has focused on increasing the stock of national or global capital as the case may be. This approach recognizes four types of capital: human made or fabricated capital (machines, factories, buildings and infrastructure); natural capital, the stock of environmentally provided assets (soils, forests, atmosphere, wetlands); human capital (investments in education, health, nutrition of individuals); and social capital (the Institutional and cultural basis for society) (Seragerdin and steeds, 1994). As for Pallisa District, like the rest of Uganda, it is natural capital that accounts for the lion's share of district wealth.

Some salient population and development indicators for Pallisa District are as follows: the total fertility rate (children per female) is 6.50; the infant mortality rate (per 1000 births) is 124; life expectance per birth at birth (in years) is 48.9; the percentage of literacy rate is 46.6; the number of children fifteen years and above is 19.5%; the number of households with access to safe drinking water is 14.6 percent; the total number of households with access to electricity for lighting is 0.37%.

The above indicators as compared to the overall national performance show a negative trend. The following table illustrates the position of Pallisa District vis a vis the overall development in the country. The following are the indicators at the district and national level respectively.

Table 1: SELECTED DEVELOPMENT INDICATORS IN PALLISA DISTRICT

INDICATOR	DISTRICT	NATIONAL
INFANT MORTALITY RATE		
MALE	133	113
FEMALE	131	112
TOTAL	**123**	**122**
UNDER FIVE MORTALITY		
MALE	219	216
FEMALE	197	194
TOTAL	**208**	**204**
CRUDE DEATH RATE		
MALE	19.2	18.7
FEMALE	15.4	16.0
TOTAL	**17.8**	**17.3**
LIFE EXPECTANCY AT BIRTH		
MALE	46.9	45.7
FEMALE	50.9	50.5
TOTAL	**48.9**	**48.1**
ACCESS TO SAFE DRINKING WATER (% POPULATION)	14.6	46.0

Source: POPULATION AND HOUSING CENSUS – 1991.

The numbers of economic activities that contribute to the level of development are many as portrayed below: -

A. AGRICULTURE:

Agriculture is the backbone of the District economy providing the most important source of household's livelihood. About 94.4% of the total population in Pallisa is engaged in agricultural related activities. Mainly subsistence is practiced and a negligible proportion 0.4% is engaged in commercial farming. Cotton is the major cash crop. Food crops mainly grown are rice, Soya beans, millet, maize, sorghum and cassava.

Agricultural production in the District is generally low having been declining over time and this may be attributed to decline in soil productivity. Moreover the problem of agricultural land shortages is becoming widespread especially in Sub-counties with high population densities.

As a result much more land is required to maintain production levels, which has resulted into increased swamp reclamation. Main causes for reduced agricultural productivity stem from unsustainable farming methods, inadequate land use policies, increased population, unreliable and Un predictable weather patterns.

Cattle keeping is picking up as a major economic activity.

B. INDUSTRIES

A number of light industries mainly agro-based exist in Pallisa District. Those that exist include: cotton ginning, jaggery, rice milling and oil milling. About 11% of the District populations are engaged in food/cash crop processing.

C. TRADE

Pallisa District relies heavily on informal petty trading and this is due to the decline of the cotton industry in the 1970s and 1980s, which used to provide a more stable source of income in form of employment. However, this decline is slowly being

reversed and the cotton industry is being resurrected. Formal trading is mainly concentrated in commercial centres and the major commodities of trade are foodstuff and household essentials like soap, paraffin, clothes, etc.

D. REVENUE GENERATION

The capacity of the Local Authority to generate resources for development is very low. This is a result of the narrow tax base. Also the majority of the people are engaged in subsistence agriculture and their incomes are very low. This implies that the District heavily relies on the Central Government and other donors for recurrent and development expenditures.

E. OCCUPATION BY GENDER

Being a dominantly rural District, about 94.4% of the economically active household population is engaged in agriculture. Furthermore 98.8% of the females are engaged in agriculture compared to 89.9% of their male counterparts. The rest are engaged in such activities as carpentry, service work, professional work and many others as portrayed from the table below. Of the economically active population, 56% are females and 44% are males.

TABLE 2

DISTRIBUTION OF ECONOMICALLY ACTIVE POPULATION BY SEX

EMPLOYMENT STATUS	MALE	FEMALE	TOTAL
Employed	3,560	808	4,369
Self employed	42,976	9,885	52,769
UWF	23,443	69,329	92,863
	69,979	**80,022**	**150,001**

Source: 1991 CENSUS UWF = Unemployed Family Worke

TABLE 3: DISTRIBUTION OF ECONOMICALLY ACTIVE POPULATION BY OCCUPATION

OCCUPATION	EMPLOYED	SELF-EMPLOYED	UFW	TOTAL
Managers	91	-	17	108
Professionals	21	-	-	21
Technicians	2,569	202	70	2,841
Clerks	295	32	11	337
Service workers	280	1,350	27	1,657
Craft workers	254	1,406	144	1,804
Agric. Workers	194	49,023	89,305	138,522
Machine operators	155	65	3	223
Elementary occupation	433	542	3,113	4,088
Not stated	77	150	173	400
TOTAL	**4,369**	**52,769**	**-**	**150,001**

THE LINKAGES BETWEEN ECONOMIC GROWTH DEVELOPMENT AND THE ENVIRONMENT

All human activity, economic and social-cultural, takes place in the context of certain types of relationships between society and the biophysical world. Development necessarily involves the transformation of these relationships and the processes that bring about this transformation are a complex mix of economic and political factors magnified by the rate of economic growth, for they interact in ways that are difficult to predict. There is a growing consensus that the present generation should manage the resource base such that the average quality of life we measure ourselves can potentially be shared by all future generations. Consequently, the concept of “sustainable development” has evolved in the recent past.

Sustainable development was defined by the Brundt commission, 1987, as "development that meets the needs of the present generation without compromising the ability of the future generations to meet their needs …… a process of change in which exploitation of resources, the direction of investments, the orientation of technologies, development and institutional change are in harmony and hence both current and future potential to meet human needs and aspirations" (WCED 1987). It has also been further defined as a process in which qualitative development is maintained and prolonged while growth in the biophysical scale of the economy becomes increasingly constrained by the capacity of the socio – ecosystem to perform in the long run, essential functions to generate raw material inputs and to absorb waste outputs of the human economy (Daly, 1987).

In the African context, it is important to define sustainable development from a historical perspective. It is not enough to compare the present with the future, since the residual effects of past practices must be considered. African cultural heritage and traditions remind us that land and its associated natural resources must be regarded as a sacred trust bequeathed to us by our ancestors. The resource base must be handed over to future generations intact or in an enhanced condition (OKIGBO 1995).

As for Pallisa District, its population has from time immemorial relied heavily on its environmental resource base. Continued exploitation of these environmental resources has exposed them to a number of risks for a number of interdependent reasons. Since over 80% of the population in the District lives in rural areas and derives most of its income from agriculture, land degradation, deforestation, lack of access to safe water, loss of bio diversity compounded by climatic variability remain major environmental concerns in the District. There are small land holdings reflecting the uneven distribution of the population and the unsuitability of some areas for farming as well as low technology levels.

When scarcity of good land is coupled with soil degradation and low levels of technology and inputs, the result is increasing deficit in food production. It is, therefore, apparently clear that poverty of the soils and reliance on rain fed agriculture coupled with invariability of climatic conditions are major constraints in using natural capital. The soils are increasingly becoming deficient in phosphorous, a key nutrient in the production of bio-mass (WB 1994). There is low content of organic matter; low water retention capacity and surface crusting. Periodic droughts have hit Pallisa District in the recent past, for example in 1980, 1994 and 1997, being the most serious ones when some people lost their lives due to famine. Causative factors of soil degradation in Pallisa include overgrazing and erosion by water and although its extent cannot be strictly quantified due to our poor database, it remains one of the most serious environmental concerns in the District.

Deforestation is a major problem in the District as forests and woodlots are receding due to increasing economic activities and pressure from an ever-increasing population. Loss of tree and forest cover exposes the soil-to-soil erosion and negatively affects water retention capacity and local climate, increasing the down stream risk of both droughts and flooding. The major economic activities are; clearing of land for agriculture, over reliance on wood fuel, which accounts for 90% of household fuel, timber logging and construction of new roads (SHARMA AND OTHERS, 1994). There has therefore been considerable loss of natural habitants and biodiversity, which have indeed been overhauled in terms of sustainable food production, medicine and ecosystem resilience.

In Pallisa like the rest of Uganda, there has occurred evolution towards a market economy without appropriate policies and regulations to support the consequential changes. Public resources, which once belonged to the state, now belong to individuals (Land Act 1997). In all areas of environmental control and ownership the role of the public sector is decreasing due to economic liberalization. This is aimed at addressing economic distortions, which may increase economic growth and hold great potential in

improving environmental management provided the appropriate environment policies and regulations including market-based instruments are put in place. However, enforcement of environmental regulations is difficult due to the scarcity of resources to support existing institutions and lack of harmonized legislation on environmental issues. There is therefore need not only to harmonize the environmental legislations but also coordinate all existing institutions in the District but within the confines of the existing laws, policies and regulations.

Political transition in an extremely fragmented district has created a more open democratic society by empowering local people through decentralization and this has had direct effects on environmental management and social development in the District. Environmental management has been devolved to Sub-county Local Governments and Parishes without horizontal linkages amongst themselves to promote sound environmental husbandry. Fragmentation into small Sub-county units seriously impedes addressing issues at the inter-Sub-county levels, such as; water shed management for major wetlands, protection of marine and swamp ecosystems, and protection of forests and woodlots.

Increasing urbanization and migration have further cast a dark shadow on the path to sustainable use of environmental resources. Since 1987, Pallisa District has been urbanizing at a very fast rate. Although urban areas provide an array of economic opportunities, they confront a range of environmental problems: there is inadequacy of physical infrastructure and services to cope with the growing number of urban migrants.

Over-crowding creates negative health consequences; there is also increased exposure to concentrated wastes; unsustainable use of resources and increasing settlement on ecologically sensitive areas. With the urbanization level of Pallisa District at 4.6%, urgent measures should be taken to formulate adequate policies to provide the necessary infrastructure and services to contain the escalating situation.

The above problems have been exacerbated by Pallisa District's demographic explosion without matching adoption of production technologies that reduce poverty in Pallisa District; there is a rising curve of production and population. With a population of 520,532 and a growth rate of 19.1 (SUPR 2004) economic growth should be sustained at higher rates if the welfare of the people of Pallisa is to be achieved. Pallisa's high fertility rate at 7% and the youthful age structure has led to building up of "population momentum". This therefore implies that population will increase rapidly in subsequent years exerting pressure on the natural resources and aggravating further the prevailing problems of environmental degradation (SUPR 2003).

Pallisa District being largely dependant on agriculture and associated natural resources, the demands placed on the environment to provide resources for the human activities and absorb wastes will continue to grow steadily with rising population and rising consumption levels. Even at the present level population increase is putting a lot of pressure on environmental resources.

The severity of this population agriculture-environmental nexus is compounded by low investment in human capital (human resource development), which restricts individuals to continued reliance on unskilled labour and exploitation of natural resources as the only survival options. Pallisa fortunately has in recent years improved on primary level enrolment due the Universal Primary Education in 2003. Furthermore, the primary syllabus has been revised to include environmental studies. Nevertheless, there will be need to dramatically increase its investment in human capital in terms of education and address the information gap on the environment that makes its management difficult.

To crown it all, sustainable development is multi dimensional and has three components, namely; environmental sustainability, social sustainability and economic sustainability that occur when development moves towards social and environmental sustainability and are financially feasible. (DEAT and CSIR 2000). Sustainable development aims at improving human well being, particularly by alleviating health and quality of human

resources, natural environment. This sustainability cannot be possible without understanding the internal dynamics of the changing social structures at local level. Moreover environment sustainability must be adapted to the beneficiaries' mode of thinking. It is not enough for Government officials to impose their knowledge on the beneficiaries. Critical linkages for local ownership must be built to allow the beneficiaries internalize the logic that underlies any environmental project through the process of informed participation.

POVERTY AND THE ENVIRONMENT

Poverty is linked to the environment in complex way especially in Pallisa District whose economy is based on natural resources. Poverty has many dimensions: low and highly variable income levels, physical insecurity, poor health, low levels of education, disempowerment, a heavy burden of work or unemployment and isolation both social and geographical.

Poverty and environmental degradation are covered in a vicious cycle in which people in Pallisa cannot afford to take care of the environment. Thus, environmental degradation accelerates since the poor with short time horizons and less secure access to natural resources, are unable and often unwilling to invest in natural resource conservation or management (SARD, IUCN, and SADC 1994). According to UNEP (1991) Poverty remains a major cause and consequence of environmental degradation. The poor struggling at the edge of subsistence levels of consumption and pre-occupied with day-to-day survival and limited time to plan ahead and carry out environmental management practices that give positive returns only in the long run.

The poor who depend heavily on natural resources have limited means to deal with risks engendered by bad environmental management practices. The poor are more exposed to environmental damage because they cannot afford, for example, to purchase safe water or live in a neighborhood that is less polluted. Consequently, the productivity of the poor diminishes and makes them susceptible to extreme events – metrological, economic or civil unrest.
Reducing poverty therefore, will often lead to improved environmental quality and vice versa (MINK 1993: WB 1972a).

The poor are both agents and victims of environmental degradation. Many soils in Pallisa District are severely degraded. Soil erosion aggravates the problem of environmental degradation since the existing units or plots of land cannot support the population as before. There is need for more land and investment in improving land productivity. Since the poor depend on natural resources for the satisfaction of their needs, fertile land and adequate climatic conditions are a prerequisite for food security. As land deteriorates, the poor become poorer.

The degradation and depletion of natural resources in Pallisa District has been attributed to population growth, unsustainable resource utilization, increasing urbanization and to some extent industrial activities. The consequences of these phenomena have been pressure on the natural resources resulting directly into overgrazing and land fragmentation. Moreover the growing population has also impacted on the forest cover (because) owing to the fact that over 90% of the population use firewood and charcoal as a source of energy. The three stone fireplaces commonly used in the District contribute to in door pollution and respiratory illnesses especially among women and children.

Poor agricultural yields due to degraded soils means that households must obtain an alternative source of livelihood. As most people in the District live in rural areas with virtually no alternative sources of income, they have resorted to charcoal production. Deforestation for charcoal production exposes the soil to agents of soil degradation.

Another poor coping mechanism for compensation for reduction in agricultural yields is the encroachment on ecologically sensitive areas like wetlands. In Pallisa District, wetlands are both a source of food and income. It is worthy of note, however, that there is no noticeable improvement in the people's income inspite of their encroachment on the wetlands. Fish stocks have also declined significantly in the district and of course decreased fish harvests have a direct bearing on the livelihood of the local communities. These communities have resorted to using small sized nets, which leads to catching immature fish, and other aquatic fauna thereby contributing to reduced fish stocks and loss of bio-diversity.

There is scarcity of data on the actual distribution of income and income per capita in the District. However in the rural areas where 91.2% of the population lives, the income levels are relatively low due to the collapse of the cotton industry in the 1970s and 1980s. Although cotton growing has commenced in earnest, both the level of production and the price levels are low. A kilogram of cotton fluctuates between 300 shillings and 400 shillings on the average. The yield per farmer is generally low due to land fragmentation and farming is practiced on smallholdings using low technology and poor farming methods. Due to the collapse of the traditional cash crop economy, already alluded to, the scarce food products have become major sources of income in the rural areas. These include rice, maize, millet, cassava, beans, peas, groundnuts, etc.

The above, notwithstanding, the proportion of the economically active population as compared to the total population is still very low. For example according to the 1991 census, of the total population of 357,655 (as it then was) only 150,001 was economically active and these were those aged 10 years and above, thus yielding a crude activity rate of 41.9%. Out of the economically active, only 4,369 (2.9%) are formally employed, 52,769 (35.2%) are self-employed, and the remaining 92,863 (4.9%) were unpaid family workers (UFW). This implies that 207,655 (58.06%) are economically inactive or are economically dependant. Of the total population of the economically active 97.1% are engaged, others directly in agriculture or agro-based activities and small-scale business transactions. This exerts a lot of pressure on the natural resources and increases the risk of environmental degradation.

The current statistics of 2004 are not available but the above analysis gives us an insight into the likely trend. The District lacks big business enterprises from which to generate revenue. This compounds the problem of lack of resources to finance development expenditure initiatives, let alone finance the recurrent expenditures without Central Government support. With this lack of adequate resources for development poverty has become entrenched in the populace and the alternative result is the detrimental rash for the exploitation of available natural resources leading to further environmental degradation.

CHAPTER TWO

THE STATE OF ENVIRONMENT

LAND

Environmental degradation and the need for sustainable development is a worldwide concern. In Pallisa District, the major concern is about the deterioration of the environment through deforestation, soil erosion, demographic pressures and water pollution. More recently due to increasing rate of urbanization, the dumping of wastes has also become a serious pollution problem.

In Pallisa District, as in many other Districts the country over, environmental degradation generally derives from peoples interaction with the basic natural resource, land. 91.2% of the districts population lives in rural areas and depends on land for survival. Land is required for cultivation, grazing and to provide building materials and energy. In many parts of the district, serious land degradation has occurred due to high population pressure and poor management. Widespread forest cleaning, bush burning and over grazing have exposed the soil to the effects of rain, wind and heat, leading to rapid decline in soil productivity through structural deterioration, acidification leaching and more importantly soil erosion. The traditional sentiments of over stocking have led to over exploitation of the remaining rangelands.

In this chapter we shall cover the environmental issues related to land under the following headings:- Topography , Land use, Land tenure systems, Size and Land degradation.

TOPOGRAPHY

The geomorphology and relief in the district is generally characterized by plains at altitude ranging from 900 to 1200 meters above sea level (average of 1145metres). Relative relief is so low, seldom not more than 21 to 30 meters. The two main geomorphologic features of the district are:-

AREAS OF IN-FILL

These are found mainly at the shores of lakes and swamps such as Gogonyo, Mpologoma and Namatala. The Lakes include Nyaguo, Myasala Gigati, and Meito to the west-northwest and southern parts of the district.

REMNANTS OF LOW LAND SURFACES

These constitute the rest of the district and are largely characterized by open plains.

LAND USE

Pallisa is a densely populated District with average population density of 329 people per km^2. The majority of the people estimated at around 91.2% live in rural areas, like most Districts in Uganda. These rural inhabitants depend on agriculture as a major source of food, income and employment. The following table shows the land use pattern in the District.

Table 1: LAND USE /COVER STRATIFICATION IN PALLISA DISTRICT

LAND USE	AREA/KM^2
Broad leaved plantation	0.4
Wood land	9.2
Bush land	4.3
Grass land	134.5
Papyrus/reed swamp	312.1
Small scale subsistence farming	1460
Large-scale uniform farm land	2.2
Built-up area	2.7
Open waters	66.3
Impediments	0.3

Source: statistical Abstract, 1996.

LAND TENURE

Land tenure means the system, which determines and regulates the manner in which land is owned, occupied, used and disposed of. Whereas a faulty land system can result in continual hemorrhage and environmental degradation, a well-conceived and properly managed system can constitute its reliable and steady protection.

The ideal system should be one that secures the best possible balance between the need to exploit the environment to satisfy man's present requirements and the necessity of preserving the capacity to satisfy the same needs in future.
Land tenure, therefore, constitutes rules, regulations and procedures that govern the rights, duties and liabilities of the people in their use and control of land as a resource.

There are three types of land tenure in Pallisa district:- Customary tenure, Free hold and Leasehold.

CUSTOMARY LAND TENURE.

This is the most wide spread tenure in the district it is a system where rights over land are regulated by local custom. In Pallisa district individual ownership of land is predominant. Each family has its specific piece of land where it lives and utilizes it for agriculture. The head of the Household, who in most cases is the male, decides on the use and transferability of the land. The new generation gains access to land through inheritance. In many cases this is done through dividing of the piece of land, which has led to land fragmentation. The consent of the clan leaders is always necessary when disposing off land under this system. The advantage with this system is that people easily understand it as they have been with it for a long time. However due to lack of records for reference some times it makes settling of land disputes difficult.

FREEHOLD TENURE SYSTEM.

This refers to land owned by individuals or organizations in perpetuity at no cost of acquisition. The 1969 Public Lands Act vested former crown lands occupied for Government purposes in the Land Commission as freehold. Some institutions also acquired freeholds. For example churches acquired freehold titles for land they occupied. This includes Budaka Church of Uganda, Kaucho Catholic mission, Pallisa District Local Administration institutions, etc. Under freehold, a certificate is issued and the interest in the land goes on in perpetuity with the exception of payment of taxes and observance of land controls imposed in public interest.

LEASEHOLD TENURE

This system is based on an agreement between the lesser (Government) and lessee (Developer). Here land is leased out for development. In contract, the lessee is given exclusive rights to use and possess the land for a definite period of time, usually 49 years for rural areas. In urban areas, such as Pallisa Town council, the urban authority grants leases, and it is usually for 99 years after completion of the development.

The advantage with this system is that, it is possible for government to attach user/environmental conditions to the lessee and specify how the given land holding could be used/ developed. It retains the right to cancel the lease in case of misuse. Most certainly of all tenure systems found in the district, the leasehold seems to be the most suitable for the attainment of both conservation and development.

SIZE

Pallisa District covers an area of 1564 square km and is made up of 4 Counties and 28 Sub counties. Of all Counties, Pallisa is the largest with an area of 612.6 square km, while Butebo is the smallest with a land area of 304.8 square km. Below is a table showing the total land area in the four counties

Table 2: LAND AREA IN THE FOUR COUNTIES IN PALLISA DISTRICT

COUNTY	AREA (KM^2)
BUDAKA	383.9
BUTEBO	304.8
PALLISA	612.6
KIBUKU	387.9

LAND DEGRADATION

Land degradation on agricultural land threatens the sustainability of growth and welfare of many people in the district who depend on agriculture for their livelihoods including many of the poorest people in Pallisa District. In some cases the people who depend most on the land are the ones who contribute much to its degradation.

The term “land degradation” has been used to describe a number of problems. Land degradation means reduction or loss of the biological or economic productivity and complexity of rain fed crop land, or range, pasture, forest and wood land resulting from the land uses or from a process, arising from human activities and habitation patterns, such as (i) soil erosion caused by wind and or water (ii) deterioration of the physical, chemical and biological or economic properties of soil and (iii) long term loss of natural vegetation. Land degradation affects the biodiversity, climate and hydrological patterns in the district.

EFFECTS ON BIODIVERSITY

Croplands are substantially modified from their original natural state, and their levels of biodiversity are generally substantially lower than those in the natural habitant. Nevertheless agricultural lands can contain considerable biodiversity. Land degradation does actually reduce the remaining biodiversity.

The main direct adverse effect of cropland degradation on biodiversity is likely to be on below ground biodiversity. Diverse and abundant organisms help to maintain soil fertility and productivity and are fundamental to soil quality. The degradation of soil's physical and chemical conditions can damage this biodiversity.

In most cases, however, the impact of cropland degradation on biodiversity is likely to be indirect. By reducing productivity on the existing cropland, degradation can force farmers to clear additional areas of natural habitant to maintain production. It should be remembered, however, that land degradation is not the only cause of agricultural expansion.

As for rangelands, they tend to be less modified from their natural state than croplands and do contain much of the original biodiversity. Livestock often shares rangelands with considerable wildlife in the district. Degradation, therefore, can cause relatively more damage to biodiversity on rangelands than on croplands.

Many factors that cause pasture degradation are also likely to have adverse impact on biodiversity. For example, both livestock and wild life will suffer if access to areas that provide critical grazing are restricted. As both livestock and wild life are restricted to smaller, often less favourable areas, competition between them is likely to be exacerbated.

EFFECTS ON CLIMATE:

Terrestrial ecosystems are important carbon sink. The stock of carbon stored in the upper one meter of the world's soils is estimated to be about 1.5 times the amount of carbon stored in biomass (Stefano Pagiola, WB paper 16) Because croplands and rangelands tend to have relatively low above ground biomass, the linkages between land degradation and climate change are likely to come primarily from changes in soil carbon.

Some actions, which cause land degradation, can increase carbon emissions directly, for example, burning crop residues causes both fertility loss by preventing the return of nutrients to the soil and reduce the build up of soil organic matter and increased emissions.

Consequences of land degradation affect the solid carbon cycle. Lower production of crops and pasture results in the lower carbon inputs in subsequent period (less root material, less leaf litter less crop residues), this reducing carbon storage.

Land degradation on croplands and rangelands is likely to reduce the ability of soils to serve as a carbon sink and release carbon currently stored in the soil to the atmosphere. The magnitude of this effect is difficult to estimate however.

HYDROLOGICAL CHANGES

An off-site effect of degradation, which has caused much concern are the changes in hydrological patterns. If land degradation reduces infiltration rates more of the rainfall will runoff, resulting in: -

- Reduction in dry season stream flow, reducing the availability of drinking water and reducing water supply for irrigation.

- Increases in storm flow resulting in flooding down stream and increased riverbank and streambed scour, thus increasing down stream sedimentation.

- Reduction in aquifer recharge.

Changes in timing, volume, and velocity to create flow and ground water recharge, can also alter natural lake, river line, estuaries, and marine habitants, with adverse consequences for and riparian ecosystems.

It is worthy of note also, that in addition to changes in quantity and timing of stream flows and land degradation can often have adverse consequences on water quality. Sediment increases the turbidity of stream, damaging fish and other aquatic life forms. It also increases the cost of portable water supply. In addition nutrients lost from agricultural land can cause problems when they collect in waterways by stimulating the growth of algae and other plants, which deplete the available oxygen.

CAUSE OF LAND DEGRADATION:

The main causes of land degradation are: high population growth rates, poor methods of cultivation, deforestation, bush burning, and over grazing. These factors have a negative effect on food security. Despite increases from 1986 on per capita food production in the district it is less than that of 1970s. The government has come up with PMA to address these deficiencies and expand agricultural production (MFPED/MAAIF, 2000)

Population pressure:

Based on estimated land area of 1,564 km^2 and the population census data, land is becoming increasingly scarce as the district population continues to increase at high rate of 2.86. The district is densely populated with an overall population density of 329 persons per square km. In 2001 the population was estimated at 520,532. 91.2% of the population lives in rural areas and are heavily reliant on agriculture, characterized by small land holdings. With the ever-increasing population, land fragmentation is inevitable.

When the population densities were low, it was possible to practice traditional conservation measures characterized by shifting cultivation and bush follows system (Jameson, 1966) including the use of complex crop patterns like inter cropping or mixed cropping and sequential planting (Willy and Osiru, 1972) and the use of mixtures of the crops and annual crops (Nye and green land 1960) now commonly known as agro forestry. IITA (1990) suggested that vegetative fallows were able to sustain the productivity of traditional farming system in various ways. However in many parts of the district vegetative fallowing has been largely abandoned. Because farmers lack sufficient labour to open up new areas for cultivation (which may have been fallow), they continue using the land currently under cultivation without rest.

Overgrazing:

Over grazing by traditional cattle keepers is also contributing to land degradation. These cattle keepers depend entirely on natural pasture and keep as many animals as they can handle often out of step with the carrying capacity of the area. The cattle keepers do not practice proper pasture management, which results in over grazing of rangelands and their subsequent invasion by unpalatable grass species such as cymbopogon afrunardus and thorn bushes of Acacia hockii.

Although not yet a serious problem in the district the increasing concentration of livestock in the district, especially in the sub-counties of Apopong and Gogonyo is likely to result in over grazing and trampling of vegetation rendering the surfaces bare.

Bush burning:

It is a common practice to engage in annual bush fire in the district. Fire can be an effective management tool if applied correctly, and early enough. Otherwise the fires tend to encourage the emergence of fire-resistant and fire tolerant species which themselves may not be suitable for pasture.

Agrochemicals:

Pollution through the use of agro chemicals is another cause of soil degradation. Todate agriculture in Pallisa district is generally of low yield and low technology. Nonetheless, as we move towards modern agriculture and the growing of high value corps the use of agro chemicals is expected to increase. Although the total amount of agro chemicals used in the district is unknown, considerable amounts of fungicides, herbicides and insecticides are applied especially in cotton growing and on horticultural crops.

The most commonly used fertilizers are ammonium sulphate, urea, nitrogenous fertilizers and potassium fertilizers. As agriculture modernizes, these quantities of agro chemical inputs are likely to increase.

Soil Erosion:

Soil erosion is the principal manifestation of land degradation in the district, caused by surface run off or wind where vegetation cover has been removed through clearing of land for agriculture, poor cultivation practices and over grazing. Although there is scarcity of data on the rate of soil erosion in the district, the extent of soil erosion is serious as shown by the national statistics. Soil erosion accounts for over 80% of the total cost of environmental degradation in Uganda, conservatively estimated at 4-12% of gross national product (slade and weitz 199).

Evidence of sheet and rill erosion is all over the district especially in those sub counties which are densely populated and where continuous cultivation is practiced. Much as the magnitude of the erosion problem has generally been appreciated. Existing policies and legislation is highly inadequate to address the problem. Moreover there is insufficient institutional capacity and lack of coordination and net working among the few existing institutions whose work relates to soil management and productivity thus contributing more to the degradation. The lack of awareness (among major land users) of appropriate soil management techniques, combined with poverty and demographic conditions that have characters the district have also contributed to soil degradation (SOER 2000).

In response to the problem of escalating land degradation government prepared a national soil policy, which has recommended the following priority actions: create a nation soil research institution, develop district soil profiles, revise and up-date related and relevant policies, develop a land use policy and develop monitoring mechanisms to assess policy impact and attitudinal change towards sustainable utilization. With the enactment of the land Act 1998, Ownership and management of land in the district has improved. What is left is enforcement of its provisions. Although quite progressive, because of the hurried enactment of the land act, some issues were overlooked. The law was enacted without the accompanying land use policy. Moreover, the law is weak its provisions for sharing of benefits of land ownership among family members. Hence the gender aspects of the law may have to be revisited

FOREST AND WOOD LANDS

Forest, trees and woodlands are important because they play multiple ecological economical social and cultural roles. A forest is a type of vegetation dominated by trees many species, which are tall at maturity and have straight trunks. The canopy is typically deep being composed of several layers of foliage and the herbaceous. Vegetation is generally open and lack tunock-forming grasses, which are characteristics of many types of savanna. Forest is treated together with woodlands. The major difference between woodlands and forests is that the latter trees are charalistically shorter than in forest and the canopy is less dense.

When all is said and done forest have been of great benefit and value to man. Forests serve the purpose of recycling of moisture and protection of watersheds. Absorption of carbondioxde and eventually reducing its conservation in the atmososphere, maintenance and improvement of local climate prevention of soil erosion and floods provision of medicinal plants, food, timber wood fuel, recreation and ecological support.

It is worthy noting that there is increasing concern about the detoriating state of forestry in the District. Natural forestry is receding, ecological services, are declining there is increasing demand on forest products. Moreover management weaknesses constrain development. In Pallisa district there is only one central government natural forest reserve in Saala in Kibuku County totaling 316 hectares and 269 hectares under Local Government forestry reserves. The District Local Government owns gazzetted forest reserve areas in Limoto, Kabuna, Jami, Goli-goli and Adwarat. There are also some scatted woodlots of less than one hectare in the district.

Table: Area Under Forestry Reserves

Name of the Reserve plantation	Area (Ha)	County	Authority	Status
Saala	316	Kibuku	CFR	Severely degraded
Limoto	93	Kibuku	LFR	Severely degraded
Kaburna	31	Budaka	LFR	Severely degraded
Jami	13	Budaka	LFR	Severely degraded
Goli-goli	44	Pallisa	LFR	Severely degraded
Adwarata	88	Pallisa	LFR	Severely degraded

Source: Forest department Pallisa 2004

There are a number of significant new initiatives currently under way, which are relevant to the forest sector. The district has launched a frame work of public sector reform, with the aim of divesting a number of district department including some aspect of forest management sector, widening planning approaches under the Poverty Eradication Action Plan (PEAP 1997), the plan for modernization of agriculture (PMA 2000). These provide a holistic framework for eradicating poverty through a mult-sectoral intervention that enables people to improve their livelihoods in a sustainable manner. The PMA includes forestry as one of the focus departments along with agriculture, fisheries and livestock.

The variability of the forestry ecosystem species and genetic levels is the essence of life and the natural plants and animals. Wildlife is not significantly well developed in the district. There is no detailed inventory, which has been carried out yet on wildlife. There is no clear approach and policy of habitat and species conservation for a wildlife reserves. Unfortunately the few central and local forest reserves have been encroached on for human activities.

The once rich biodiversity of the district is under threat from unsustainable harvesting, habitat conversion, the introduction of Allien species like lantana camara (Kapanga), unsustainable Exploitation of plant and Arial species by herbalists and weak enforcement of forest policies and laws plus uncoordinated sectoral linkages.

It's true that there is no detailed inventory on forestry ecosystem for wild life and other genetic species in the district as yet. Nevertheless the wild life population in Pallisa is low partly due to habitat loss as a result of agricultural encroachment.

Ownership status:

The distribution of forest area by ownership of management is that the forest estate in Pallisa District comprise of one central government natural forest Saala in Kibuku County that totals to 316 hectares. The other are local forest reserves that comprises of Limoto in Kibuku county Kabuna and Jami in Budaka county Goli-goli and Odwarat in Pallisa County of which all of then are severely degraded. However given the apparent state of exploitation of the central and local reserve however there is still potential for communal forest strategies, farm forestry for house hold use and farm forestry for the market. This means that all what is required is the supportive institutional framework in which the District forestry programmes can thrive.

Threats:

Deforestation is the main Environmental issue confronting Pallisa forests, savanna woodlands and bush lands. Impacts of deforestation include destruction of habitats, reduction in water catchments, potential of some of the forests, soil erosion, siltation of water bodies, forest degradation, reduced agricultural production, loss of environmental functions and the District revenue. Encroachment, which involves conservation of gazzetted forestland, which has been turned into rice fields.

Urbanization contributes to a bigger threat through increased demand for wood fuel, charcoal and construction. Institutional failure, and the forest Act 1964 chapter 246, which provides for the management of forest is outdated and cannot adequately address recent development in decentralized governance and environment. For Instance, it is ineffective in dealing with forestry related offences. The existing fines stipulated in the Act for forest offences are not different enough to discourage many of the illegal activities under the existing forest Act. The mandate of the forestry department as the lead agency in the forestry sector is confused in the gazzetted forests only there is no comprehensive law governing utilization of forest on public and private lands on which much of deforestation is taking place. Furthermore the Act does not address tenure of the trees outside gazzetted forests.

Another threat is drought and irregular rain fall patterns, lack of free seedlings despite the availability of seedlings for sale, a big percentage of the people in Pallisa are poor and cannot afford to purchase large numbers of seedlings. This is compounded by lack of sufficient skills necessary to raise their own seedlings using local materials and too few ill motivated extension staff to create a big impact on ground.

There is scarcity of land, which has led to little land being available for tree planting. Agricultural expansion has resulted into loss of the little available forest cover/wetland vegetation as people clear land for rice growing and animal grazing.

Opportunities

In Pallisa district there are policies such as doubletree planting that actually may lead to large-scale investment in private sector growing of industrial forests plantation. The forest sector creates significant employment probably the equivalent of 100 jobs of which 30 are in formal sector and the majority in fuel wood and charcoal production in the informal sector. However a significant amount of people are employed in commercial fuel wood production.

Environmental services and biodiversity are significantly contributed by the forest sector to the District. Although these services and values are not easily quantified they are recognized as integral to agricultural productivity, cultural and spiritual values that depend on trees and environmental services.

Utilization:

Forest in the district promotes timber for furniture and construction. Fire wood for households and institution and charcoal obtained from forests. Forests areas are being cultivated and the main pressures behind this include:- Increased demand for forest product, Need to obtain cash, Land shortage for cultivation without proper management leading to deforestation with its negative environmental and economic impact. Afforestation and re-afforestation polices should be put in place in the district to enforce the preservation of forests.

Agro Forestry:

Agro forestry practices based on natural resources management system through integration of trees in farms and landscape diversities that sustain production are being promoted in the District. Tree planting on farms in the district is being promoted in all land tenure systems. However there is a need to devise a mechanism for delivery of forestry extension and advisory services so as to achieve sustainable form of land use.

The district recognizes the unmet demand for farm forestry advice across the district and the need for professional services. These services are developed within the district institutional framework to include advocacy and monitoring by the department responsible community Based Organizations like Limoto Tweweyo Agro forestry Association Buseta in Buseta sub-county, Kakoro Twegaite Agro-forestry project are carrying out agro forestry practices.

The district look further to promote extension and advisory services that support farmers, local communities and institutions in conservation and sustainable management of forestry, sustainable management of forests and development of farm forestry.

WETLAND RESOURCES.

In line with the national wetland goals, wetlands in the district form an integral part of the environment and their management must be pursued in context of the interaction between conservation and development strategies. Owing to the importance of wetland resources, their conservation should be achieved through a coordinated, cooperative and a participatory approach involving all stakeholders. For sustainable management of wetlands, it is imperative that the present attitudes towards wetlands be changed.

TOPOLOGY AND SIZE

Pallisa district covers about 1992-km^2 of which 711 km2 or 36% is wetland areas 338 km^2 is permanent wetland area of which 5 km^2 or 07% has been converted, while 373 is seasonal wetland of which 253 km^2 or 68% has been converted.

The wetlands in the district are part of the lake Kyoga drainage system. The main wetland system within the district are Lwere, Namatala and Mpologoma, all of which drain into lake Kyoga.

The wetlands occur mainly in flood plains and Lake margins. Those along rivers exist due to impeded drainage kaiyape and Katoikaworoni wetlands are tributaries of the lwere system. Kachabwoi, kasuroi, Kotut, Gernecigati, Kanurwo, Nyaguo are Lake Shore wetlands of Lake Kyoga. Tributaries to the Mpologoma system inclide Adoto, Apapai, Kawi, Koburio, Lemwa Limoto and Nyakwa wetlands. Kakoli, Kibuku, Naboa, Saala Nandusu and Nakyolomboga drain into the Namatala system.

The main source water to these wetlands is mainly surface flow i.e. rivers, precipitation and ground water seasonal; wetlands are flooded during peak rain periods.

SUMMARY TABLE OF WETLANDS IN PALLISA DISTRICT.

KYOGA-LWERE DRAINAGE SYSTEM (199KM^2

NAME	AREA (KM^2)	TYPE	LOCATION
L. Geme	8.5	P	Gogonyo sub-county 2km north of Gogonyo HQS
L. Gigati	56.8	P	Gogonyo sub-county, north west of Gogonyo HQ
Kachabwoi	2.1	S	Agule sub-county, 2km north of Agule GHQ
Kaiyape-Nabwali-Kabatalemu	25.0	P>S	Kibale Butebo and Baraigira sub-counties
Kasuroi	10.6	S	Agule and Gogonyo sub-counties 4km West of Kabole trading centre
Kitiikuwo-nom	17.7	S	Kakoro, Butebo and Iki-Iki sub-counties
Komuno	15.5	P	Gogonyo and Agule sub-counties 5km west of Agule GHQ
Kotuk-kongngolais	14.9	S	Agule, Pallisa and Kibale sub-counties, 4km north of Kabole trading centre
Lwere-Omororoto-Kakoro	43.5	P >S	Boundary between Kumi and Pallisa district
L. Nyaguo	4.1	P >S	Agule sub-county, 5km north Agule

Categories of wetlands

There are both permanent and seasonal wetlands in the district. The seasonal ones flood in peak rainfall months. The wetland based on dominant plants include fresh water emergent reed swamps dominated by single reed species (papyrus, typhus species, vossia species) seasonally flooded herbaceous wetlands where species composition is variable; seasonal flooded wooded grass land; fresh water floating leaved but rooted vegetation and fresh water rooted macrophysics (MNR, 1996).

The advanced stage of pediplanation over most of the district and the reversal of drainage following slight tilting of the surface wave resulted in the formation of swamps. Most of these swamps are dominated by sedge papyrus, Cyprus latifolius, miscathidium violaceum Typha australis and cladium jamaicenses (DEP Pallisa, 1998). The two communities most identified under this mapping are:

(a) Cyperus papyrus swamps

This occurs on permanent water logged peat mats at an altitude of 670m to 2170m rainfall ranges from 750 mm to 2000 mm a year Cyperus papyrus is usually of 2.5 to 4.6m in height.

(b) Miscanthidium swamp

These are slightly drier swamps than the Cyperus papyrus ones, often situated between the permanently water logged swamps and dry humus with alluvium. The substratum is only seasonal and undated through the water, which is always not far from 1050mm to 1500mm a year, and at maturity this vegetation may reach on height of 4 maters. Dominant species include the delicate violet inflorensceises of miscanthidium violceum, which stand up to 2.5 high, dissotis incana, Leersia hexandre, and helipterums squamulesa. The factors which determine the type of wetland which, develops in areas are as mentioned in the box below

FACTORS INFLUENCING WETLAND FORMATION IN PALLISA

* Water permanency – permanent or seasonal
* Water depths
* Shape of the basis containing the wetland
* Soil type
* Altitude (which has a temperature effect only)

The main wetland systems do not generally contain a single type of wetland, each system is a mosaic of types (though fresh ones and salty ones do not always occur together in a system). A wetland is actually only part of a complex and varied system of linked wetland types which make up a larger system. A large system like mpologoma man) contains small streams in the Upper section papyrus in the middle section and open water flowing into a lake in the final section.

USES

Undeniably, the greatest use of wetlands in the district is water, whether fresh for drinking or for other purposes. Livestock and other domestic animals/birds rely on water from wetlands all over the districts.

As for building purpose, wetlands serve as a major source of sand and gravel. Infact the rural communities also extract clay from wetlands for diverse purposes including making clay pots and bricks.

Agricultural activities around wetlands in the district are common because of the rich soils and moisture levels often lacking in upland areas rice growing, tomato and cabbage cultivation are the most practiced agricultural activities. It should never be forgotten that most of the domestic fish consumption is owed to the existence of these wetlands.

Wood from wetlands is the most handy in the provision of domestic fuel in most rural comities moreover the same wood is also used for making of furniture and even building material actually wetland are so important to the local communities that their enter homestead are constructed from materials from them. The papyrus and other items from wetland are used for making mats and other crafts for commercial purposes.

Several species of plants and animals in the wetland ecosystem are important sources of not only food but also medicine indeed the perceive and potential uses of wetland cannot be over estimated.

STATUS THREATS AND OPPORTUNITIES

Despite the significant importance of wetland to our lives, and despite the laws and policies that government has put in place to protect them Uganda's wetlands Uganda's wetland are still water quantity and quality and the micro-climate of wetlands has been altered with catastrophic consequences for future crop production, wetland resource use, and public health.

The following are the known forms of wetland encroachment and destructive use of wetlands.

Drainage conversion of wetlands for agricultural purposes. Wetlands especially those with shallow water have been put under intensive cultivation of crops such as sugar cane, sweet potatoes, rice, yams and eucalyptus.

Extensive areas in Pallisa district have been affected by agricultural encroachment moreover management of these wetlands is often poor.

Dumping of waste (garbage): The industrial area is per-urban areas are located near wetlands, which encouraged dumping of waste into wetlands.

Deforestation of swamp forest. This is done for wood and other craft products.

Rampant swamp fire, while the consequences of wetland burning are not generally known, this poses a threat to the bio diversity of these areas some of which may not be fire hole rant. It also triggers succession changes leading to the replacement of natural wetland vegetation. Most of the fires in the district are started deliberately by hunters or to encourage the regeneration of new papyrus.

In Pallisa district, an extensive area of the seasonal wetlands is under intensive cultivation. 68% of the seasonal wetlands have been reclaimed for rice growing. Some of the reclaimed wetlands have become un productive and abandoned within 2 years.

The impact of this massive reclamation of wetlands in the district has been the reduction in the number of permanent streams, disappearance of permanent springs and low ground water yield in the wells.

It has been noted that rice growing does not necessarily destroy the wetlands but it changes the natural form to a damaged ecosystem, which is generally artificial. Although many bird species associated with wetlands may not be affected by changes in the wetland ecosystem, others like the crested crane require natural swamps for breeding. Other birds are actually attracted to rice growing areas.

The weaknesses that have led to the sustainable use of wetlands are outline in box below:

ENCROACHMENT ON WETLANDS IN PALLISA.

Weaknesses that have led to the encroachment on wetlands in the District
❖ Population pressure is threatening the existence of wetlands, especially in heavily settled areas ❖ Mechanism for enforcing environment laws and regulations on wetlands are still weak. There is ambiguity in the concept of "government holding wetlands on behalf of the people", confusion still exists over the rights and obligation of ownership and management of wetlands. ❖ There are still information gaps regarding the functions, values and importance of wetlands to the people. ❖ Alternative sources of income have not been identified yet so as to dissuade people from continuing to over exploit wetlands resources.

- **Source: NEMA, 2002**

Inspite of the foregoing threats, the government of Uganda has under taken important steps to conserve wetlands. In 1986, the Government declared a ban on large-scale drainage of wetlands, in 1989 a national wetlands programme was established. The programme embarked on developing a policy on wetlands that was established in 1995.

Wetlands are presently protected under the following pieces of Legislation (a) the Constitution of Uganda, 1995: (b) the National Environment Statute 1995, (c) the Local Governments Act 1997, (d), the Water Statute 1998, (e) the Wetlands Policy 1995 and (f) Guidelines for wetlands developers 1995. The National Environment (Wetlands, River Banks Lake Shore Management) Regulations 2000.

Sustainable utilization of wetlands resources and management is enhanced by the above legislations while the overall objective of the wetlands policy is to enhance equitable distribution of wetlands benefits to all stakeholders. There are also well-defined procedures for initiating development projects in wetlands areas, and dealing with wetlands conversion.

The wetland Phase III Programme, 1996, addresses issues pertaining to wetlands management, conservation, research and policy implementation including institutional strengthening and inter-sectoral coordination. Public awareness programmes are taking place at all levels of governance in the District.

In 1996, a wetlands inventory for Pallisa District was made and local communities established a project in 1998 at Limoto to develop and extend methodologies for sustainable wetlands resource management. The main focus of the project is eco tourism.

The notion that wetlands are a source of wealth will only remain true of wetlands are used sustainably. It is therefore incumbent upon the district to take action to conserve the environment. The National Policy for the conservation and management of wetlands resources and the relevant enabling laws provide a necessary framework for action.

It is therefore proposed as follows:

1) There should be no further drainage of wetlands. A detailed social and environmental audit of the impact of wetlands conversion to rice growing should be carried out.

2) Byelaws and Ordinances should be made at the District level consistent with the Wetlands Policy and National Environment Statute.

3) The Department of Agriculture should advise on the sustainable management of rice fields, keeping in mind the conservation of wetlands.

4) The District authorities should ensure that detailed Environment impact Assessment is carried out before development activities are undertaken in any wetland.

Ecological Resources:

The major ecological features in the District wetlands that form an important resource base are their soils, flora and fauna.

The soils in the District are generally sandy. The dominant soil types are shallow gray-brown and reddish brown sandy loams, which lie over literate. The soil in wetlands includes black and gray clays: and peaty sands and clays. The parent material is river alluvium and papyrus residue.

The plant community in most of the permanent wetlands is papyrus (Cyperus papyrus) Typha species and vossia species. The shallow open lakes contain a lot of floating vegetation, mostly Nymphae (water lily) and submerged species, such as ceratoplyllum.

The seasonal wetlands contain Echinochloa Cyperus and loersia grass. Miscanthus is dotted in a few places and phragnites is occasionally found along river Hydro-philla ("Atillo") is a common secondary vegetation in modified seasonal wetlands.

Ambatch trees form island in some permanent wetlands most of the wetlands have been converted by human activities except those which are difficult to drain e.g Lwere, Namatala and Mpologoma.

As regards the fauna wetlands that are still intact have situnga otter and reedbuck. Wetlands that are on the fringes of lakes have crocodiles and hippos, wetlands fish especially catfish and lungfish are common.

Other species such as mastacemblus Frenatus are found in seasonal wetlands. Such as that up stream of Namatala wetlands. Birds are numerous and include ducks, cranes, pelican's storks and ibis. The rice fields also have many birds especially weaverbirds and quelea quelea.

Functions of wetlands in the District:

Wetlands in the district have diverse direct and indirect values they act as both filter and purifies of our water, stripping any pollutants in it and making sure that the water is clear when it leaves the wetlands. Because of this function it has been possible for the local communities to obtain clean and safe water at little cost.

Wetlands also soak up water for long period and release it slowly thereby controlling the rapid flow of water when it rains heavily the spongelike
Characteristic that protects houses and gardens from serious flooding.

Even during drought wetlands retain water and release it slowly and evenly. This enables the local communities to maximize the amount of land that can be kept under agricultural production, as well as the length of time during year for carrying out agriculture activities.

Wetlands help to ensure that boreholes and wells do not dry up. Some wetlands even help to maintain the flow of rivers throughout the year. In areas with un disturbed wetlands, water is stored and released slowly, causing relatively little damage to people and property.

Other functions of wetlands include the following: erosion and sedimentary control, carbon retention, climatic modification, wildlife and habitat functions, biomass export, recreational, eco-tourism, transport, bio diversity, genetic resources conservation, landscape aesthetics and cultural heritage.

DISTRIBUTION OF WETLANDS IN THE DISTRICT:

The wetlands in the district are part of the lake Kyoga drainage system. The main wetlands systems within the district are Lwere, Namatala and Mpologoma, all of which drain into Lake Kyoga.

A large proportion of the district is covered by wetlands. Of the1992 Km^2, 711km^2 or 36% of the District is wetland area.

The wetlands occur mainly in flood plains and Lake margins. Those along rivers exist due to impeded drainage Kaiyape and Kataikaikawunoni wetlands are tributaries of the Lwere system. Kachabwoi, Kasuroi, Kotut, Geme, Gigati, Kamunwo, Nyaguo are Lake Shore wetlands of Lake Kyoga. Tributaries to the Mpologoma system include Adoto, Apapai, Kawui, Kobulio, Lemwa Limoto and Nyakwa wetlands. Kakoli, Kibuku, Naboa, Saala Nandusi and Nakyolomboga drain into the Namatala system.

The main source of water to these wetlands is mainly surface flow i.e. rivers, precipitation and ground water. Seasonal wetlands are flooded during peak rain periods

SUMMARY TABLE OF WETLANDS IN PALLISA DISTRICT

KYOGA-LWERE DRAINAGE SYSTEM (199KM^2

NAME	AREA (KM^2)	TYPE	LOCATION
L. Geme	8.5	P	Gogonyo sub-county 2km north of Gogonyo HQS
L. Gigati	56.8	P	Gogonyo sub-county, north west of Gogonyo HQ
Kachabwoi	2.1	S	Agule sub-county, 2km north of Agule GHQ
Kaiyape-Nabwali-Kabatalemu	25.0	P>S	Kibale Butebo and Bulangira sub-counties
Kasuroi	10.6	S	Agule and Gogonyo sub-counties 4km West of Kabole trading centre
Kitiikuwo-nom	17.7	S	Kakoro, Butebo and Iki-Iki sub-counties
Komuno	15.5	P	Gogonyo and Agule sub-counties 5km west of Agule GHQ
Kotuk-kongngolais	14.9	S	Agule, Pallisa and Kibale sub-counties, 4km north of Kabole trading centre
Lwere-Omorototo-Kakoro	43.5	P >S	Boundary between Kumi and Pallisa district
L. Nyaguo	4.1	P >S	Agule sub-county, 5km north Agule
Adoto-Dodoi	48.5	P >S	Bulangira, Kibuku, Buseta, Kadama sub-counties 7km south of Bulangira trading center
Apapai	20.2	P > S	Kibale, Puti-Puti and Pallisa sub-counties 4km south of Pallisa town
L. Kawi	7.3	P	Gogonyo and Kasodo sub-counties 10km west pf Pallisa town
Kobuno	14.5	P >S	Gogonyo. Pallisa, Kasodo sub-counties 4.5 km north west of Pallisa town
L. Lemwa	11.3	P	Kasodo, Puti-Puti, Buseta sub-counties 4km south of Pallisa town
Limoto	40.6	P > S	Puti-Puti Bulangira, Kadama, Buseta sub-counties 7km south west Pallisa
Mpologoma	207	P	Tirinyi, Buseta, Kasodo, Gogonyo sub-counties Boundary-Pallisa and Iganga
L Nyaguo	7.2	P >S	Gogonyo sub-county, approximately 4km west of Gogonyo GHQ

NAME	AREA (KM^2)	TYPE	LOCATION
Kakoli-Kamonkoli	9.6	S	Naboa, Iki-Iki, Kamonkoli sub-counties 4km west of Kamonkoli
Kibuku	11.5	P >S	Kibuku sub-county and 5km east of Kibuku GHQ
Naboa	5.4	S	Naboa and Iki-Iki sub-counties 3km east of Naboa GHQ
Namatala	85.7	PS	Forms boundary between Pallisa Tororo and Mbale districts
Nakyalomoga	5.9	S	Budaka sub-county east of Nlweya trading centre
Nandusi	8.3	S	Budaka and Naboa sub-counties between Budaka and Naboa trading center
Salla	17.4	P >S	Kibuku and Kadama sub-counties 7km west of Kadama trading centre

MANAGEMENT OF WETLANDS

During the colonial period, these wetlands were designated as reserves and placed under the central government. Traditional institutions also had in place, machinery and authority to protect them. How ever, with political changes after independence, the powers of traditional institutions were reduced, and the local communities lost sense of attachment to wetlands.

The people whose lands border the wetlands have assumed the role of landlords and thus the collective responsibility over wetlands has been modified. While cultivation is carried out by individual owners, the other resources are harvested by all the community. In such dual tenure, it is difficult to implement common strategies for sustainable management of wetlands, (Kizito and Nsubuga 1996).

The junsdiction of these wetlands as a decentralized function is under the institutional framework of the Local Governments at all levels they are charged with the responsibility of formulating polices and byelaws for the proper management of the wetlands resources. Most of the wetlands and their surroundings are under customary tenure. The vast and deeply water logged wetlands are public land e.g Mpologma, Namatala and lake Kyoga fringes. A few wetlands are gazzetted as forest reserves e.g Limoto and Saala.

BIODIVERSITY

INTRODUCTION

Biodiversity is the variability of life expressed at the ecosystem, species and generic levels. The term describes the total diversity of living organisms and components of the ecosystem in a given area. Areas of high biodiversity have many species of organisms both plants and animals-and a great variety of habitants. In effect, therefore, this variability is the essence of life and the basis of the existence of all life forms.

Although the Pallisa District is devoid of any natural forests and the forest reserves that we had have been depleted, the District is endowed with a considerable number of wetlands, open waters and savanna plus a few scattered wood lots. From these people derive food, medicines and raw materials. Many introduced plants and animals constitute the basis of the District's Agriculture. Agricultural biodiversity, in predominantly altered or man-made ecosystems, is of great interest to the District since agriculture is the mainstay of the District's economy.

The district attaches a lot of economic import to its biodiversity resources. The presence of indigenous biological resources and their diversity provide a wide range of direct benefits because they generate products which are used for subsistence income and employment purposes. Moreover, outside direct utilization, the Districts ecosystems and their component species and their diversity generate a wide range of services. There has not been a valuation of these services by the District but at national level the value of services have been reported at the conservative level of U. Shs 300 billion (or Us $ 200 million) per year (NEMA, 2000).

The Pallisa economic structure, activities and policies have direct links with biodiversity. These links are a result of side effects of economic activities. Pallisa, like the rest of the country, has undergone increased in economic growth over the past decade and therefore this could lead to various implications for biodiversity conservation. The direct implications include the following: -

- Over exploitation or depletion of some of the biodiversity. As an example, the levels of fish catch around lake Kyoga may not be sustainable in the long run.
- The introduction and encouragement of new species/varieties that have the ability to out- compete indecency with indigenous or traditional varieties e.g. Nile perch on lake Kyoga.
- Agricultural modernization results in increased use of agrochemicals and fertilizers that seriously affect the soil biodiversity richness.

The indirect implications include:

- The fact that both micro and macro-economic policies have consequences to species diversity and richness because the district economy depends on biodiversity-impacting activities (e.g. increased agriculture or agricultural modernization and associated effects like over-harvesting of forest and fish products etc).
- Inadequate consideration of biodiversity issues in national economic policies, strategies and planning.
- Gaps and inconsistencies within biodiversity related policies and legal frameworks that tend to favour investment at the expense of conservation.

Ecosystem Biodiversity

The word ecosystem is hard to define but it is generally useful and widely used. The major natural ecosystem in Uganda includes: forest. Woodland, Savanna, wetlands and aquatic system. Conserving these ecosystems inevitably conserves species and their genes.

The aquatic system in Pallisa District comprises several rivers, the main ones being R. Namatala and R. Mpologoma into which other smaller rivers and streams drain. Several lakes exist, namely, Lake Lemwa, Lake Meito, Lake Nakuwa, Lake Geme, Lake Nyaguo, Lake Kamunu and Lake Nyasala. This ecosystem is home to several species of fish, snakes dragon files and butterflies among other.

Although much of the district forest cover has been depleted, there are some scattered woodlands of the combretaceious and vitaey type plus savanna mosaics and woodland savanna. As it has been reported (Jolly, etal, 1997) before conversion to other uses – principally agriculture and livestock keeping – about. 70% of Uganda was covered by savannas of various types. Very little of it remains as it was before modern man became a significant presence in the country 2100years ago. Fire, grazing, brownsing and shifting cultivation should have had their different effects. There are negligible areas which are still natural as they were found. In Pallisa District, one can recognize two broad categories of situations in these former savannas:

- Areas that have been burnt, brownsed and grazed by domestic livestock but not cultivated. These presumably have retained most of the species of native plants that can withstand fire and livestock and most of the animals except large mammals that depend on them.
- Areas that have been converted to agricultural practice, urban areas and other forms of human settlements. There is no data depicting the rate of conversion the general observation is that much of the original natural savanna has been tampered with due to population increase.

Wetlands are an important feature of the ecosystem biodiversity in Pallisa District. A great portion of the district is covered with permanent swamp, much of it papyrus. There are also seasonal swamps. The two types of swamps taken together constitute what is usually called wetlands. In the District wetlands cover 35.7% of the total district area. The total area of the District is1992 Km^2 of which the total wetland area is711 km2.

Although the wetland area of the District seems promisingly sufficient, the rate of encroachment is telling. According to the satellite survey of the 1990s, 256 $km^2$of the District wetland area has been converted to other uses that include rice growing and grazing, which represents 26.6% of the original wetland area of 969 km^2. The total contribution of the district to the national wetlands conversion is 10.85%. Although we have not received any subsequent data on wetland. Conversion the general impression is that there has been continual drainage of the wetlands inspite of the announcements of bans.

All types of wetlands are important for conservation. A number of species including several bird species are more or less endemic to papyrus swamps whilst seasonal wetlands are also notable for their high diversity. In Pallisa District the wetlands are part of the L. Kyoga drainage system, which comprises the following major wetlands: Adoto, Apapai, Kuburio. Lemwa, Limoto, Nyakuwa, Kakoro, Kibuku, Naboa, Nyakayalomboga, Nandusi and Saala (which directly drain into the Namatala system which is a water shed of mount Elgon).

Endangered And Rare Species

Loss of species in the district occurs in two different ways; decrease in numbers and disappearance from a particular area. Whist there is some evidence that the latter is occurring, stopping short of complete extinction, there is scarcity of data on the rate of disappearance, decrease or outright extinction. Due to the rash for human survival and development, several habitants have been destroyed contributing further the steeply declining loss of the district biodiversity. These habitants include forests, woodlands, wetlands and aquatic systems.

The decline in forest cover and grass lands (especially elephant grass and spear grass) has affected quite a number of species. Although there is no detailed data, the population of fruit bats has greatly declined due to the felling of fruit trees on which bats depended for food. Fruit bats basically eat fruits from indigenous species like Mvule and figs. Even forest monkeys are rare having migrated to neighbouring Districts especially Iganga as a result of the deforestation of Saala and Limoto forests. As for large mammals like baboons and leopards they are reaching near extinction.

Probably the most lamentable loss or decline in species has occurred in our aquatic systems. A notable example is the loss of fish species and decline in fish stocks in L. Lemwa, L. Kawi, L.gigati, L. Nakuwa, L. Geme, L. Nyaguo, L.Kamuwo and L. Nyasala. In the case of L.kyoga, while generally accepting the fact that there has been considerable occurrence of similar losses in both fish stocks and species, the objective situation cannot be stated specifically. With many areas not yet having been systematically studied, including much of the districts shoreline, the situation remains unclear. It has, however, been suggested that some fish species like the catfish have changed their diets (Olowo and Chapman, 1999) thus encroaching on other species. One undeniable fact, through, is that the explosion of the Nile perch biomass is a major factor in the depletion and reduction of the species.

Noteworthy also is the decline in the number of crocodiles and hippopotamus due to hunting for food, medicine and ornamental purposes among other things. Bird species such as the pink backed pelican and the African king fisher eagle which selectively eat fish of different sizes are disappearing mainly because the decline in fish due over fishing.

As already mentioned elsewhere, wetlands are another reservoir of biodiversity. According to the National wetlands management programme's inventory on biodiversity, conducted between 1992-95,wetlands support a verity diversity of plants and animals (FAO, 1996). The national wetland inventory reveals the existence of the following types and respective numbers of species in our wetlands: macrophytes 271, birds 159, fish 52, amplbians 48, dragonflies 43, mammals 14, and mulluses 9. These wetlands biodiversity is now threatened. The government is at present strengthening the legal framework and institutional structures for wetland management to meet the challenge. A national wetlands conservation programme (1989) was established in 1989 followed by a comprehensive wetland policy 1995. These have since been reinforced by the National Environment (Wetlands, River Banks, Lakeshores Management) Regulation, which came in force in January 2000 (GOU 2000).

The Main Causes Of Loss Of Biodiversity In Pallisa District

Several practices have been cited as contributory factors in the loss of biodiversity in the district. These practices range from over grazing, land fragmentation, over fishing, indiscriminate use of pesticides heavy dependence of natural resources for agriculture and construction to drainage of wetlands. The main causes of biodiversity loss, however, can be divided into three broad categories namely: loss of habitant, unsustainable harvesting and introduction of alien species.

Habitant Loss

The population growth rate of Pallisa District is relatively high and this population is largely rural. Since the majority of the rural population depends on agriculture, increased demand for food and income for these additional people means new land areas must be opened for agriculture. Human settlements have greatly encroached on the District wetlands and also virtually depleted the forest reserves. Scarcity of land for agriculture has indeed exerted tremendous pressure on the biodiversity resources of the District. Other practices that threaten biodiversity by contributing to habitant loss include: over grazing, bush burning and indiscriminate use of pesticides and fertilizers which pollute our waters and destroy pollinators.

Unsustainable Harvesting

During the 1920s the forest cover and woodlots in Pallisa district were generally sound. The major threat then was charcoal burning and to a lesser extent firewood collection. With increasing population without corresponding investment in the energy sector, woodlots have dwindled to pitiable proportions and forests have been virtually wiped out thus destroying a very important ecosystem.

Moreover, there has been a growing demand for furniture (for schools and domestic use) since the mid 1980s, which has culminated into a very lucrative market to date. During the same period the construction industry flourished and with it the increase in the demand for construction materials like timber, sisal and other related products from the forests and wetlands. This has lead to unsustainable harvesting of these products hence the gross loss of biodiversity

With respect to aquatic biodiversity, the use of inappropriate fishing gear by most fishermen in the district has also led to the decline in species due to catching of immature fish. In lake Kyoga, some unscrupulous fishermen used to engage in the use of poisonous chemicals to catch fish, which destroyed other forms of aquatic life. That coupled with the presence of the water hyacinth negatively affected fish populations in the lake.

Introduction of Alien Species

According to NEMA (SOER 2000/2001) there are 180 tree and 55 other plant species, which have been introduced to Uganda over the last few decades, many of which are fruit or ornamental trees. Some of these species have become invasive, for example, the tonna ciciate, cassia spectabilis and cedrela Mexicana. It is quite unknown as to where

the water hyacinth originated but it is expected to have invaded lake Kyoga from lake Victoria waters.

The introduction of the predatory Nile perch (Lates niloticus) in lake Kyoga in 1950s and 1960s has resulted in the disappearance of some 200 to 250 haplochromine species by 1999. National statistics show that whole Nile perch catches rose from 620 metric tones in 1970 to 92,031 metric tones in 1988. the combined catches of seven common species in Uganda's waters declined from 40,950 metric tones in the 1970s to 12,975 by 1988 (FAO, 1996)

Opportunities

The initiatives by the Government of Uganda in as far as environmental management and biodiversity conservation is concerned dating from the mid 1980s have opened a lot of prospects at the Local Government level, and particular in Pallisa District, of addressing the pressing biodiversity concerns of the day. These are reflected in the Governments comprehensive policy packages, the supportive legal framework on environmental management and sectoral programmes that enhance sound environmental management. The district is currently taking advantage of these positive developments to harness its biodiversity resources and the prospects of biodiversity conservation look bright and ever.

The enabling and conducive policy environment in the country has set open doors for the district to firmly enhance its capacity to address its biodiversity concerns. The government comprehensive development framework, the Poverty Eradication Action Plan (PEAP), embraces environmental concerns and it is the cornerstone of all other sectoral and cross-sectoral investment plans and strategies which are expected to conform or be compliant to PEAP in order to access government resources. For example, the health sector strategies plans have a whole section on environmental health.

Other government initiatives that create clear opportunities to enhance biodiversity conservation in the district are the universal primary education (UPE) and the Programmes for the Modernization of Agriculture (PMA). The UPE programme provides for four children from each household to access free primary education. Education is an important avenue for inculcating biodiversity ideals and creation of awareness of the need to conserve biodiversity. In addition, NEMA has also put in place two environmental education strategies, one for the formal and another for the informal sectors. Environmental education being an integral part of the formal curriculum, the curriculum should be developed to intensively reflect biodiversity conservation needs and cultivate a sense of belonging to and/ or ownership of this biodiversity and the importance of its conservation.

In the PMA environmental concerns have been greatly entrenched in its implementation mechanism. Specific activities or projects developed under the PMA are supposed to be subjected to environmental impact assessment. Micro-credit loans are also subjected to environmental eligibility. These environmental concerns as mainstreamed in the PMA and PEAP if well implemented will lead to sustainable development of the District and preservation of the district biodiversity. Other government programmes and laws that have created new avenues for biodiversity conservation in the district concern especially the forestry and wetlands sector. The wetlands phase III programme initiated in 1996 addresses issues pertaining to wetlands management, conservation, research and policy implementation including institutional strengthening and inter-sectoral coordination. As for Pallisa District, a wetlands inventory was carried out at the National level as in the other seven selected Districts which will enable us better plan for our wetlands resources. In addition, a national wetlands information system to provide readily accessible and relevant sources of information to all stake holders was inaugurated in 1998 in three project sites, including Limoto in Pallisa District. The purpose of these sites is to develop and extend methodologies for sustainable wetland resource management by the local communities in the forestry sector. A very comprehensive programme was initiated by Government, namely, the Uganda forestry umbrella sector programme. Under the programme a new forestry policy was formulated 1995 which led to the enactment of the Forestry Act 2003 which replaced the Forest Act of 1964 which was outdated. A comprehensive forest master has been developed and a Forestry Authority has been put in place. There is also a programme which is meant to focus on greater involvement of the private sector Local Government Local communities which will foster better biodiversity conservation.

The new pieces of legislation that will help the district enhance its biodiversity conservation capacity include the following: -

(a) The constitution of Uganda 1995, which specifically provides for the ecosystems

(b) The local government Act 1997 which empoers and mandates the district and local commental management.

(c) The water statute 1995.

(d) The National Environmental statute 1995.

(e) Wetlands policy1995

(f) The land Act 1997.

(g) Guidelines for wetlands developers 1995

(h) The National Environment (Wetlansds, River bankes, Lakeshores management) regulations 2000. these laws and regulation if well implemented will create a

favourable environmental Management possibilities and forester the district efforts toward sound biodiversity conservation practices.

In line with the foregoing enabling laws and policies, the District earmarked on a mass-sensitization programme which cultivates in the formulation of parish environment Act plans (PEAPs) and subsquently the sub-county Environment action plans (SEAPs). This has enable us to start formulating the District Environment Act Plan which shall eventually be encorporated into the District Development plan for pallisa District in due course. Such a measure will create the opportunity to enact the relavant bye-laws purtaining to environmental management which areapparently ar per now urgently needed. Biodiversity concerns cannot only be enorced through sauctions and coersion but the district will have to intersity its mass sensitization programme and also offer incentives to individuals and the local communties. Already the primary schools in the District have thisasncally responded to the environmental conservation dramma competions. Local communities in Limoto, sala, Kotolo kabyna and ebe where are managing their own environment projects. Even indiduals have started their tree hursuries with the techninical assistance of the district environment officer many more volunteers have been approaching the district environment officer in increasing of numbers for both techinical and material assistance. The sky is the limit.

Urbanisation, properly managed, provides prospected for reducing pressure on our biodiversity resources. According to the un habitat Agenda “Unrban settlements, properly managed, hold the promise for human development and protection of natural resources through their ability to support large numbers of people while limiting the impact on the natural environment “(UN, 1992b). both Agemda 21 (UN 1992a) and the habitant agenda agreed on the framework for sustainable development of human settlements. Pallisa District will need to put in place appropriate policies to govern the rate and level of urbanisation of mitagate the negative effects of urbanisation the most important beginning point world be to formulate a land-use policy and develop land use plans to guide development since urbanisation has a heavy toll on our ecosystem and other biodiversity aspects such measure will go along way to improve on our biodiversity conservation pratices. The operationalization of the National Environmental fund,envisaged under the National Environmentl statute 1995, will also go a long way to enhance our biodiversity conservation prospects. The funds that will be avaiced for environmental management, espencially at district level, shall enable the district halt or reverse environmental degradation so as to guarantee improved productivity of the environment and the reource base the fund will also enable the district to build and strengthen human institutions and capital in environment/natural resource management so that we can continually respond to new demands and challengs espencially as regards biodiversity conservation further more, future options for resource conservation and development shall be held open by formulating sound policies so that inversi by loss of biodiversity are avoided and positive conservation culture and altitudes are inculcated into the people (NEAP secretariat, 1999,

Urban Areas
INTRODUCTION

The number of urban centers in Pallisa District is growing with a marked increase in their populations whose growth rate exceeds the average growth rate of the whole country (MFED, 1993). The sized of the population of an urban agglomeration and the nature of the urban environmental problems it faces are mental problems it faces are strongly correlated. Typically, urban centers experience common problems like pollution, congestion, water supply, sanitation, and solid waste management and so forth. The nature of the urban environment is influenced by such other factors as geographical location, climatic consideration and socio-economic development. Population size, nevertheless, remains a good indicator of the type of urban environmental issues of urban center are falling (WB 2004).

Although 99.2% of the district population live in rural areas, the growing population in the district urban centers is putting a strain on environmental resources consume more resources than their rural colander parts according to the 1991 census analytical report, an urban area is a locality with at least 1000 people in Pallisa District, the largest urban center is Pallisa Town Council with a population of 23,919 of which 11,502 are male and 12,417 are female (UP&HC, 2002).

A part from Pallisa Town, which also acts the chief administrative center, there are other urban centers spread throughout the district especially near sub-county head quarters. The other urban center in the district are: - Budaka, Naboa, Kibuku, Petete, Butebo, and Kamonkoli. Other trading centers, which are likely to be gazzetted, include Tirinyi, Iki-Iki, Kadama, Kaderuna and Kabwangasi.

Several factors have led to the emergently and growth of these urban centers. As administrative centers, some of the centers acquire and develop facilities befitting of their status. Infrastructure developments like decent housing, electricity, hospitals, post offices, telephone services became necessary. Many of the urban centers serve very rich agricultural hinterlands, which necessitates reliantly on cotton, rice and other food crops. They also act as distribution centers for produce and manufacture goods.

General Conditions In The District Urban Centers

Urbanization has led to the dramatic transformation of the district in recant decades. The demographic shift is already having a major impact on the nature of environmental management challenges in the district, and this impact is likely to grow in the coming decades. Like to grow in the country, the urban population is growing at a faster rate than the national average. Rapid urbanization has led to urban sprint and physical infrastructure deficiencies as well as unsustainable natural resources use.

Urbanization can be a positive force in the environment when it reduces pressure on over crowded or ecologically fragile rural areas or frees up arable land by concentrating dwellings in smaller areas in many parts of the district, individual land holdings are already too small to be sub-divided further for inheritance, leaving a growing problem of landless rural poor. Urbanization can also reduce demand on local natural resources if urban areas import products from a wide area or adopt less resource consuming technologies such as looking with hydropower generated electricity instead of wood fuels.

However, this does not apply to many urban areas in the district which have been liked to over- grown villages" A large proportion of urban residents in the district lack the service usually associated with urban areas, such as piped water supply, sanitation and electricity. These urban dwellers also remain directly and heavily dependent upon the natural resources of surrounding rural areas including fisheries, forests for wood fuel and building materials river beds (river sand, domestic livestock and bush meat, and so forth. These dense concentrations of consumers can place enormous strain on the resources of these near by rural areas, many of which are unable to support sustainable livelihoods of the rural population itself.

The inter dependence of rural and urban economies is particularly evident in the district, where tons and village households maintain multiple ties through seasonal immigration and remittances, creating an informal safety net. Since the urban centers in the district are not properly managed, it has led to increased poverty and integrality, which belies the promise of urban development according to cities in transition report (world Bank, 2000 b), urban poverty is growing in scale and extent in both urban and peri-urban areas in reality urban poverty in the district is much broader than economic deprivation; it includes squalid living conditions, risk to life and health from poor sanitation air pollution, crime and violence, traffic accidents and natural disasters, powerlessness, and break down of traditional family and community safety nets. The poor, especially the poor children are particularly hurt by a deteriorating environment. The urban transition offers the district opportunities to improve the quality of life of this people but the realization of this potential will depend on the quality of urban management and sound district and local policies.

Waste Management

Like many urban centers elsewhere, the greatest in the urban centers having effectives sanitation system untreated sewage is returned to water bodies that serve as a source of drinking water and as a habitant for vital fish resources. Solid waste accumulated around dwellings, leading to disease and high vermin populations.

Drainage systems are also often inadequate or poorly maintained, creating ideal conditions for water collection and disposal in the district, which means large quantities of waste enter the ground water and surface water. Ground water contamination is more serious because many people drink untreated ground water in the district.

Urban waste in the district can be categorized as follows: domestic waste or house hold waste which includes kitchen ruse, waste from commercial units and markets that are related to items sold; medical or clinical waste which includes items like bandages, sharp objects dead issue, organs and radio active wasters; industrial waste generated from industrial processes and debris or waste from construction, excavation from construction demolition sites; NEMA, 2003).

Of all the urban centers in the district, it is only Pallisa Town Council where waste collection and disposal management is officially streamlined although with a lot to be desired. Garbage collection, disposal and management are poor. Residents are not sensitized about good waster management and even the tractor, which the Town Council was for garbage collection, is over whelmed by the capacity of garbage growth. In fact of the garbage is littered everywhere. It is even unfortunate that there is single landfill for garbage is recklessly dumped around the outskirts of the town. It is not surprising; therefore, that polythene (even plastic) bags deposal has posed a great danger to the environment.

Although there is no up to date inventory on qualities of waste generated in all urban areas in the district, a number of observations have been made in as far as urban waste management is concerned (NEMA/UEPF/JMC, 1999). There is need to create awareness on waste reduction. Recycling has been suggested as a good corrective measure but the mode of waste disposal in the district undermines the potential for recycling. The current methods collect adequate quantities that can justify investment in appropriate technologies. There is also no link between waste generation and potential use for economic activities there by rendering incentives for awareness on the benefits of recycling is limited, there is also lack of appropriate technologies, which limits opportunities for recycling (NEMA/UEPF/JMC, 1999).

The most economical method of waste disposal in the district urban centers could be the establishments of landfills will the appropriate guidance from the district and other relevant authorities on waste management regulations observant. However, there is limited technical capacity for appropriate landfill citing, design, construction, and operation and post operation management. Even with the availability of such technical capacity, most urban centers in the district cannot afford the construction of ideal sanitary landfills. The situation is exacerbated by the inadequacy of access to peri-urban neighbourhoods.

With the apparently increasing rate of urbanization, it is incumbent upon the district to enforce the appropriate policies and regulations in order to promote more sustainable waste management. The local communities must be sensitized on the ways of making the best use of wasteland cultivate a culture of proper waste disposal and also choose waste management practices, which minimize the risks of immediate and future environmental pollution and harm. The main priority of sustainable waste management must be to reduce the amount of waste produced to a minimum, consistent with technical and financial constraints.

Infrastructure Physical Planning, Housing And Settlements.

The district land office is responsible for planning and management of land with particular reference to land surveys and deeds, urban planning, and architectural design. In Pallisa District there are currently 39 centers on the path of urbanization, and of these only 6 have been gazzetted and planned as indicated in the figure below: -

TABLE……PALLISA DISTRICT URBAN CENTERS

S/N	SUB-COUNTY	CENTER	REMARKS
1.	BUDAKA	BUDAKA	Gazatted
2.		Nabweyo	Not gazzetted
3.	Iki-Iki	Iki-Iki	Not gazetted
4.		Kavule	Not gazetted
5.		Kadenga	Not gazetted
6.		Kerekererie	Not gazetted
7.		Namirembe	Not gazetted
8.	Kaderuna	Kaderuna	Not gazetted
9.	Kamonkoli	Kamonkoli	Not gazetted
10.		Kasiti	Not gazetted
11.	Lyama	Nansanga	Not gazetted
12.	Naboa	Lupada	Not gazetted
13.		Kakule	Not gazetted
14.		Naboa	
15.	Butebo	Butebo	
16.		Petete	
17.	Kabwangasi	Kabwangasi	
18.	Kakoro	Kakoro	
19.	Kibale	Kibale	
20.	Bulangira	Radio Uganda	
21.		Namgaiza	
22.		Kagumu	
23.		Goli-Goli	
24.	Buseta	Buseta	
25.		Kasasira	
26.	Kadama	Kadama	
27.		Naiswa	
28.	Kirika	Saala	
29.	Kibuku	Kibuku	
30.		Tirinyi	
31.	Agule	Agule	
32.	Apopong	Kabole	
33.	Gogonyo	Kapala	
34.	Kameke	Kameke	
35.	Kasodo	Ngalwe	
36.		Kasodo	
37.	Pallisa	Akodot	
38.		Pallisa	
39.	Puti-Puti	Kamuge	

At the time of compiling this report there is a lot of uncontrolled construction and ungazetted. This has led to poor sanitation, pollution and congestion of buildings to the extant that some buildings do not have access roads. There need, therefore, for proper planning and enforcement of the town and urban act, and the sanitation Declaration.
This will initially necessitate Topographical plotting and design of ladastral plans for all these centers to enable designation of these areas into residential recreational civil and industrial.

In Pallisa Town council, however there has been a fair attempt at physical planning. The town has been gazetted, demarked and zoned for different purposes. The residential area is located in the north and south of the town while the commercial center is centrally located. Recreational facilities are located on slightly higher ground not prone to flooding in the eastern part of the town. The southwestern part of Pallisa town was zoned as an industrial area mainly because of its proximity to the swamp so that an affluent from the factories would go direct and neutralized to minimize any negative impact on the environment.

The housing situation in the district is generally poor. The houses found in most urban centers are normally made of burnt bricks and roofed with iron sheets while a few are roofed with files. These houses are usually permanent or semi-permanent. Housing construction is supposed to be supervised by the respective urban authorities, which approve building plans or structures in the designated areas. They are assisted by local urban committees, which are formed and entrusted with this responsibility.

Housing construction in most of these urban centers is dominated by the private sector. The pace of putting up new structures does not match with the rapid increase in the urban population. This has resulted into shortage of houses which in turn has led to congestion in certain centers like Pallisa town which precipitated rapid construction of temporary house on the out skirt of Pallisa town.

Linear and Nucleated settlement types exist in Pallisa Town Council and other urban centers though not properly planned. The Linear development of urban centers a long high ways is wasteful and increase the cost of provision of services. In order to have a balanced, healthy and sustainable growth of human settlements, it is important to promote land use patterns that minimize transport demands save energy and protect open and green areas.

The emerging rapid increase urban population in the district has not been matched with growth and development of the base physical infrastructure, housing and social amenities. Over crouching is the order of the day, characterized by the spread of squatter settlements dilapidated housing (slums) and poor sanitation contributing to increased incidence of water borne and vector transmitted diseases. Rural urban migration has been cited as a major contributory factor to the increase in the number of urban poor, aggregating the problem of in employment, the proliferation of slums and increasing pressure on existing social services (NEMA, 1999).

The quality of housing in the district urban centers varies significantly with the various geographical, economic and social-cultural setting of he area. However in most of the informal settlement many housing units are poor designed and are in a dilapidated state due to lack of rapier and maintenance generally, basic services such as water supply, sanitation and other infrastructure are lacking in these units. The mushrooming unplanned settlements in urban areas have led to the drainage of swamps to access clay for brick making incidences of malaria have increase because the pits left behind provide fertile breeding ground for mosquitoes.

All in all, there is a need for urban authorities to strictly enforce the Town and urban Act and follow all the relevant physical planning regulation. It also calls for full implementation of 1978 housing policy, the 1993 national shelter strategy and the 1995 National population policy.

Road Network

The Road network as by far the most important transport infrastructure for the District. It is composed of limit road feeder road earth roads with exception of simple roads the rest abides lamentable state of maintenance, berry in mind that road networks keep pale with the population density the least population areas are Gogonyo sub-county and the most isolated in terms of road transport.

The District has 53 kilometer of bitumen of their 50 kms run from Tirinyi to Doho rice Scheme connected to Mbale and the remaining three kms are covered within and around Pallisa hospital the road is still in a perfect corrdition as it has just been rehabilitated and provided with an adequate drainage system it is man farmed by the ministry of works Transport and communication and has a width of 15 miles first class murram road cover a distance of 97 kms and this is from Tirinyi to Pallisa to Kamonkoli, and Pallisa to Ladoto still this is a responsibility of ministry of works and in good condition with the expletory of drainage system which needs these simple minimum road home a width of 12 meters

Tamac Road In Pallisa District Under Law Of Central Government

NAME OF ROAD	CATEGORY	LENGTH (KM^2)
Tirinyi-Mbale	Bitumen	50
In and around Pallisa hospital	Bitumen	3
Tirinyi to Pallisa to Mbale	Class, murram	72
Pallisa to ladoto	Class, murram	25
	Some superior works	

Second class roads cover a distance of 195.3km and 3rd class cover 76.62 km, there are now left with a with of 4 meters and Ib the responsibility of the District Administration, there are numbers earth road of unknown length which are maintained by L,C,S and resident committees where these was pass. They are in a deplorable condition and some are impassable at certain times of the year.

Feeder Road Network

NAME OF THE ROAD	DISTANCE	PROJECT WHICH REHABILITATED
Kalapater-Kasodo	14.5	
Kabwangasi-Kakoro-Kalapala	33.8	
Kadama-Kibuku-Buseta	15.2	UTRP
Gogonyo-Agule	14.1	
Pallisa-Agule	13.7	
Kamuge-Agule	20.4	
Budaka-Petete	20.4	UTRP
Butebo-Ladoto	13.2	
Iki-Kakoro	12.0	
Pallisa-Kasodo	11.1	
Ladoto-Kamuge	11.3	
Pallisa-Gogonyo	15.9	

Total length of class 11 roads	195.4	

NAME OF ROAD	DISTANCE	PROJECT WHERE REHABILITATED
Kaite-Kameke	19.0	
Pallisa –Ladoto	9.6	
Kabwangasi-Kamonkoli	7.8	
Tirinyi-Kibuku-Bulangira	20.4	GITEC
Kakoro-Kachumbala	2.5	
Agule-Kumi border	3.2	
Budaka-Iki-Iki	11.6	
Kakoro-Kidongole	2.5	
Total length of clan III	76	

Source superior works Pallisa

In addition to road network, Pallisa has river/water transport but limited to access there in no provision for air transport as facilities are lacking, the railway line covers the district in Eastern part of Butebo county a distance of 6 kms there is no railway station in Pallisa as a remit this mode of transport is not utilized and is not of any significance it the District.

Constant

The district works department does not have equipments for road construction and maintenance proper strong facilities are lacking, the department is under staffed with lack of qualified personnel all road over seers were reinvented where in most cases the roads become impassable the road are always reduced to 4 meters of both carriage way on drainage.

Road Network Programs

Tirinyi Mbale road was upgraded to first class tarmac road, an idolatry has been done on Tirinyi-Pallisa-Kumi road and work to bitumen road is due to start, the same applies to Pallisa-Kamonkoli route, ministry of local government pledged to await the District with

the necessary road equipment to help their in road several NGOs have come to the rescue of Pallisa to rehabilitate part of the part of the dilapidated roads, there are GITEC while has rehabilitate 40 kms UTRP 15 kms, they have done full rehabilitation but reduced then sizes to 5.2 meters carry way and change for easy cost maintenance

Roads Rehabilitate By NGOS

NGO	ROUTE	LENGTH (KMS)
GITEC	Abila-Kameke-Agule	20
	Tirinyi-Kibuku-Bulangira	20
UTRP	Pallisa-Gogonyo	5
	Pallisa –Agule	5
	Kibale-Kamuge	5

ROAD NETWORK (AS ABOVE)

OTHER SERVICE PROVISIONS

Most of the basic social services in the district have been decentralized and are under the control of Pallisa local government with decentralization, local governments have assumed a significant role in service delivery. Because local government is closest to project beneficiaries and often have more infor mation on local concerns and more options available to address, they are seen as local counter parts for implementing projects. Being able to consult directly with service beneficiaries, Pallisa local governments have a comparative advantage in addressing the challenge of service delivery especially in the urban centers.

This is particularly important because the size of the population of an urban agglomeration and the nature of the nature of environmental problems it faces are particularly complex.

The District has one department of post office in Kaderuna, Budaka. And Kamonkoli which handle sale of mail box services, Telephone services available at Pallisa post office, they have 48 subscribers out of which only 33 are currently operational and other are believed to have been disconnected as a result of Non payment, the telephone system is old magan type with one line for incoming and out going calls and only services Pallisa Town council save for Kibuku urban center which is connected to STD system via Mbale. But hence still with private cellular pay phone at affordable fees paid and a few civil servants can afford handsets for ensure communication unlike the network, which is still a problem.

News paper reach the district at a round 10.00 am in the morning by the first faxes that plies from Kampala- Pallisa route and get accessed to Pallisa Town residents Radio to radio Uganda, capital FM, Sanyu, Radio Simba Voice of Teso, open gate, and many other Television is viewed to this who have television sets.

PUBLIC HEALTH CARE for rural and urban Pallisa is promoted by one hospital-Pallisa hospital located the district headquarters within Pallisa Town council, it is meant to admit 109 Patients but more are accommodated, in addition there are 3 well quipped health centers (Kamuge, Budaka, and Namenyo which is private with 18 dispensaries and 10 sub dispensaries.

EDUCATION, education facilities, particularly in primary are sufficient in lottal there are 170 primary school and several private schools, 22 secondary schools 5 have advanced level and seven regarded as private schools them two government aided technical schools and one private, plus one T.T.C.

NUMBER AND DISTRIBUTOR OF PRIMARY SCHOOLS.

COUNTY	**NUMBER OF SCHOOL**
Pallisa	54
Budaka	45
Kibuku	37
Butebo	34
Total	**170**

Source district profile

Generally, sate water coverage 12 Pallisa District is poor with average walking distance moved in water being 3 kms. Water coverage stands at 25% compared with the national average which is 47% the District is a long way to go and inheritably calls for heavy funding which is not forth coming in the short run.

Most people, in the district draw from pound, swamps, nearby lakes, and flocking streams, river (Namatala and Mpologoma) valley tanks with domestic, waste and other pollutants, save for a few who have protected water sources (water springs. Boreholes and piped water systems).

Pallisa District has got 2 rainy season- long rains in March, April and May and short rain in July and August with the rest of the fear dry most swamps have been drained by the local communities who grow rice, thru lowering the water table which has cause wells to dry drying dry spells.

Latrine coverage in the District stand at 57%. The low water coverage provides a bottleneck for improvement in the state of affairs in the area of safe water and sanitation.
Many urban centers in the district do not have access to sewage facilities, which, indeed, has serious health implications since improved sanitation has a direct bearing to the health and well being of the community.

THREATS

Deforestation is the main environmental issue confronting Pallisa forests, savanna wood lands and bush lands, impacts off deforestation include destruction of habitats reduction in water catchments potential of some of the forests soil erosion station of water bodies forest degradation reduce agricultural production, loss of environmental function and the district revenue the cost of deforestation as a component of over all degradation.

Encroachment, which introduces conversion of gazetted forest land mainly into farm land like in Saala where land has been timed into rice fields, urbanization contribute a bigger threat through increase demand for wood fuel, charcoal and construction institutional failures, the forest act 1964 chapter 246 which provides for the management of forests is out dated and can not decentralized governance and emmamableal management among others. In its current form for instance, it is ineffective in dealing with forestry related offences the existing offences are not different enough to discourage many of the illegal activities under the existing forest act.

The mandate of the forestry department as the lead agency in the forestry sector is as continued in the gazetted forests only.
There is no comprehensive laws governing utilization of forests on public and private lands on which much of deforestation is taking place, further more the act does not address tenure of the trees outside gazetted forests.

Another threat is drought and irregular rainfall pattern; lack of planting material people are enthunstic to acquire free seedlings despite the availability of seedlings for sale, a big percentage of people in Pallisa are poor and cannot afford to purchase large number of seedlings using local materials and too few ill motorcade extension staff to create a big impact on ground.

There is scarcity of land, which has led to little land being available for tree planting. Agricultural expansion has resulted into vegetation as people clear land for rice growing and arrival grazing there is potential disagreement over shared resources.

OPPORTUNITIES

Pallisa as a district there are policies such as doubletree planting that actually lead to large scale of investment in private sector investment in growing of industrial forests plantations through forest sector development such as. Employment the forest sector creators significant employment probably the equivalent of 100 jobs of these perhaps 30 are in formal sector, the majority in the informal sector the majority of the activity is in household fuel wood production but significant amount of employment is found in commercial and industrial fuel wood production.

Environmental service and bio-diversity significant contribution of the forest sector to the district is the range of ecological service and bio-diversity values the forests provide although there services and values are not easily quantified, they are recognized as integral to agricultural production cultural and spiritual values that depend on trees and environmental services.

Opportunity to befall will be much tourism in the district based on forests woodland and their constant wild life and natural beauty. Although resource conservation for further economic boost to the district.

UTILIZATION

Forest in the district provides timber for furniture and construction. Fire wood for households and institutions and charcoal one obtained from forests. Forest areas one being cultivated and the main pressures behind these are and include:

- Increase demand for forest products
- Need to obtain cash
- Land shortage for cultivation. Without proper management the utilization of forest can lead to deforestation with its negative environmental and economic impact.

A forestation and re a forestation profanes should be put in place in the district to increase the use of preservation of forests

AGRO FORESTRY

Agro forestry refers to dynamic ecologically based natural resources management system that through immigration of trees in farms and no the land scope, diversities and environmental benefits for land use as all levels.

Tree planting on farms on the district is being promoted in all farming systems and innovative mechanism for delivery of forestry extension and advisory services so as it is developed to achieve sustainable form of land use.

The district recognizes the strong unmet demand for farm forestry advice across the district, and the need for professional services, these services are developed within the district framework, to include advocacy and monitoring by the departments responsible and service delivery through decentralized farmer driver mechanisms to increase integration of forestry in rural livelihood strategies through raising planting maternal of trees from wildings removal of seed vegetative parts from plants and then handling of the propagation process of maternal to raise seedlings.

There has been broad based management of trees by obtaining desired tree products and services from an agro forestry practice to Limoto Twewayo agro forestry Association Buseta in Buseta sub-county, Kakoro Twegaite Agro farmers Association, MC means Agro forest foundation Kameruka, in Kameruka sub-county. The common management activities have been coppicing, pruning pollarding, thing and weeding of Established community nursery beds. Wood lots have been established as commercial wood lots for wood production and in this essence other Agro forestry practices one on a small scale such as fodder banks and zero grazing organic manure and recycling.

The district on attention look further to provide extension and advisory services that support farmers, local communities and institutions in conservation and sustainable management of forests and in development of farm forestry.

The district is integrating agro forestry into school curricula and adult literacy maternal by supporting development of high quality tree seed and planting stock.

TOPOLOGY AND SIZE

Pallisa district covers about 1992-km^2 of which 711 km2 or 36% is wetland areas 338 km^2 is permanent wetland area of which 5 km^2 or 07% has been converted, while 373 is seasonal wetland of which 253 km^2 or 68% has been converted.

Pallisa district is generally flat with some hills and a few valleys. The valleys are wide and may or may

Table below shows the values of wetlands resources arranged according categories.

TABLE. CATEGORIES OF VALUES OF WETLAND RESOURCES.

Direct values	Indirect values	Optional values	Non-use values
Production and consumption goods and services	Ecosystem functions and services	Premium placed in future use and applications	
* Such as……	Such as……		In terms
* Fish	* Water gravity	Such as	Of…
* Wood fuel	* Water flow	*Pharmaceutical	*Cultural
* Building poles	* Water storage		
* Sand, gravel, clay	*Water purification	*Leisure	*Aesthetic kalve
* Thatch	*Water recharge	*Agricultural	*Bequest value
* Water	* Flood control		*Heritage value
* Wild foods	* Storm protection	*Industrial	* Existence value
* Medicines	* Nutrient retaliation	*Water use	
* Agriculture cultivation	*Micro-climate regulation		
* Pasture/grazing	* Shore stabilization		
* Recreation			

ATMOSPHERE

The earth's atmosphere is a paradigm of environmental resources. Under normal courses of events, the atmosphere's composition regulates itself. But the speed of regeneration

depends upon the rate at which pollutants are deposited into it, and it depends upon the nature of pollutants. In talking about a resource we need first of all to find a way of measuring it. In the case at hand we have to think of an atmospheric quality index. The net rate of regeneration of the stock is the rate at which quality index changes over time. This will depend upon the nature and extent of the pollutants that are discharged, and it will also depend upon the current index of quality, that is, the current level of stock. These are often complex, ill understood matters. There is a great deal of synergism associated with the interaction of different types of pollutants in the atmospheric sink. But the analytical points here below made remain valid (Partha Dasgupta and others)

Climate

Pallisa District experiences the equatorial type of climate with a bimodal type of rainfall increasing southwards. 82% of the year is bimodal. However the climate is increasingly changingly in the District.

Implications of climate Change and Variability in the District.

Climate change refers to the long-term change of one or more climate elements from a previously accepted long-term value; while climate variability is the disruption of normal climatic patterns that result in either excessive rainfall totals or prolonged drought conditions. Climate change and variability are important due to the District's over-dependence on its natural capital as an engine of economic growth and rural livelihoods (SOER, 2002).

Climate change

Most scientific experts agree that climate change induced by human activity is occurring and that further is inevitable. The "Third Assessment report of the inter governmental panel on climate change (IPCC 2001)" predicts that global temperatures will rise between 1.4 and 5.8 degrees Celsius over the next hundred years, a rate of warming higher than any that has occurred over the past thousand years (W B, 2004). The World Bank has highlighted the fact that most of the observed warming over the last fifty years is likely to have been due to the increase in green house gases (GHG) concentrations. As a result of this energy-led development their per capita GHG emissions today are five times higher than those of developing countries who now face the daunting risk of enhancing energy utilization while protecting their environment. That is the case of Pallisa District. At the same time, the IPCC Concluded that "most less developed regions are especially vulnerable" to the projected adverse effects of climate change. The district, therefore, would need to consider these impacts and adopt its own development path in consonance with the overall national objectives.

Despite the uncertainties about where changes in climate will occur in the district, by when, and by how much (magnitude), there is little debate on at least two key points.

Because of the rapid build-up of GHG, the earth's overall temperature will warm significantly, precipitation patterns will change and sea levels will rise. The adverse impacts of projected changes in climatic conditions will pose major development challenges for the district in its entirety.

All in all, the green house problem in relation to climate change is not a local district problem but a typical environmental problem the environmental changes throughout the world depend only on worldwide aggregate emissions of climate gases, and not how these emissions are distributed between countries. The consequences of climatic changes may of course differ strongly between different countries, but the climatic changes themselves depend on worldwide emissions.

Climate variability

Climate variability is the disruption, as it were, of normal climate patterns that result in either excessive rainfall totals or prolonged drought conditions. It involves sharp, short-term variations of meteorological elements compared to a long-term mean. Temperature and rainfall are the two variables used to measure climate variability. This variability has had a profound impact in Pallisa district (SOER, 2000/2001).

In a poverty stricken district like Pallisa, where human activities are already close to the margin of tolerance for current variations of climate, the impact of the projected changes are expected to be far reaching, adversely affecting all aspects of social and economic life for the poorest of the poor.

Status of the District climate

The district receives a bimodal rainfall pattern with the main peak running from March to June and the next one from August to November. In the period 1929 to 1970, the average rainfall was 1465mm with a monthly average of 122.08mm. This pattern has since then been fluctuating.

Table: mean monthly rainfall (1922-1970)

Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
55	78	138	225	224	108	96	118	119	125	109	78

Source: meteorological department, Kampala

Temperature

There is no major variation in temperature in the District according to data available from the meteorological station for the period between 1932-1970. The District records a mean annual maximum temperature of around 28.7^0c and a mean annual minimum temperature of about 16.2^0c. The monthly mean maximum ranges from 27^0c to 30.7^0c

where as the mean monthly maximum ranges between 15.7^0c to 17.0^0c (District Environment Profile, Pallisa).

Relative humidity

Basing on available data from meteorological station, relative humidity ranges from 84% to 91% in the mornings and reduces to between 61% and 40% in the afternoons. Needless to say, the higher the humidity, the higher the chances of precipitation. Hence, reduced relative humidity in the afternoons reduces the chances for precipitation.

Evaporation

The District experiences high rates of evaporation. Data from the meteorological department reveals that the period between 1961-1970 experienced a yearly mean rate of evaporation of about 2009 mm.

Drought, desertification and climate variability

Drought is a situation of protracted departure from the normal water availability, a water deficit long enough to cause discomfort or harmful effects. (NEMA, 1998). Desertification on the other hand is a process of sustained land (soil and vegetation) degradation in arid, semi-arid sub-humid areas, caused partly by humans. It reduces land resilience and productive potential to an extent, which cannot be reversed either by removing the cause or by making substantial investment. Drought and enhanced desertification is an eminent phenomenon in Pallisa District, although not yet perceived as a serious problem.

The amount, duration and incidence of rainfall are important aspects of the District's climate. In some years rainfall amounts have been below average leading to drought while in others, monthly averages exceed the long-term average values leading to excessive water resulting to floods which wash away bridges and roads, soil erosion and silting of water reservoirs. The typical example of such an occurrence is the Elnino phenomenon of 1997. While the absolute quantity of rainfall is important, of equal concern is the ability of the soils to retain moisture, which in turn is governed by potential evapo-transpiration. Where there is a moisture deficit, as has been in the District, there is a high livelihood of droughts (NEMA, 1997). Such a situation has occurred in many parts of the District, marked by poor rainfall and crop failure. Recent

examples are the famine of 1994 and 1997, which was due to crop failure. Since drought extends over several seasons it makes it particularly damaging (FAO, 2000).

It has been contended that apart from the cyclical nature of drought, there is some evidence of increasing evidence of increasing climatic instability in the District. Moreover that the above average rainfall periods at certain times are triggered by the Elnino southern Oscillation and others by the climatic disturbance associated with Lanina. The average warmth episode in the eastern tropical Pacific Ocean contributed to the 1997 global mean surface temperature anomaly of 0.430c above the 1961-1990 base period average (NEMA, 1999).

Atmospheric pollution and global warming

The climate of the earth is controlled by highly interactive complex process involving the atmosphere, the geosphere (land) the hydrosphere (such as Oceans, Seas, Lakes and Rivers), the cryosphere (ice sheets, glaciers and snows) as well as complex terrestrial and aquatic biological processes. Certain gases in the atmosphere such as carbon dioxide play a crucial role in determining the earth's climate.

In relation to other aspects of atmospheric pollution, global warming has become one of the greatest challenges of our times. Global warming elements include green house gases (GHG), namely, carbondioxide methane, nitrous oxides, chrolofluoro-carbons, halons, methyl bromixide and troposheric ozone. They also include suspended particulate matter like smoke, soot and dust.

Notwithstanding the foregoing, atmospheric pollutants of potential concern may be classified into conventional air pollutants (sulphur dioxide (so_2), particulates, ozone (0_3) nitrogen oxide (No_2) and carbon monoxide (co), air toxics (including lead, benzene, 1,3 butadiene, and others), and the regional and global pollutants (acid rain, carbon dioxide) is added to the atmosphere as a result of human and industrial activity globally the emission of carbondioxide from industries has risen by 38% over the last 20 years.

It is important to note that the anthropogenic emissions of cabordioxide add to the complex network of natural sinks. 40% of the co_2 is estimated to be absorbed by Oceans. Photosynthesis by vegetation on land and by phytoplankton in the seas (NEMA, 1998). Most of the co_2 is released when plants and plankton decay on are eaten by animals. In Pallisa District the accumulation of carbon dioxide depend on: Forrest destruction, Fossil fuel, other land uses. However pressure for development and technology may alter the situation in the next decades.

Air pollution

Air-pollution has traditionally been a low priority environmental issue in the district. Industrial emissions, especially in Pallisa town council, tend to be less controlled and lack

of emission-monitoring data has made it difficult to focus on this type of pollution. Nevertheless, for a variety of reasons air pollution in the district is a growing concern.

In addition, greater concerns about both global warming and acid rain have focused attention on fossil fuel burning and indeed increasing attention is turning to the poor quality of indoor air, in these areas where poor quality fuel and stoves are used for coking and heating (smith 1987,1988). Such is the case with Pallisa District. Yet, in the midst of a worsening air- pollution situation, the policy response to these problems has been slow and when steps are taken they tend to be in the direction of command and control polices rather than economic incentive approaches. In Pallisa District air pollution problems are a high level of ambient concentration of pollutant without a feasible way of monitoring standards and exposure of the community to health hazards. Indeed there is inadequacy of data and resources in the District which confound efforts to explore the like quantitatively particularly between emission, exposures, and their monitized values.

Way of regulating pollution

One fundamental point to note about pollution is for polluters to changes their ways. Here below are suggested measures to regulate pollution.

- **Economic incentives:**

Although public sprit moves a notable minority to control pollution, the major pollutants are bound by pressures from markets and stakeholders. They will reduce discharges only if they expect the additional costs to be less than the penalties which additional pollution will impose on them. Fines, pollution charges, credit refusals and even social ostracism within communities outraged about pollution may be handy in enforcing this regulatory mechanism.

- **Byelaws,**
- **Administrative interventions**
- **Sensitization.**

Global warming and the ozone layer

The ozone layer lies mostly in the stratosphere, from 12 to 50 km above the earth's surface. Together with ozone in lower parts of the atmosphere, it acts as a giant sunshade, protecting plants and animals from much of the sun's
Ultraviolet radiation. Without ozone, the life forms that have developed on earth could not flourish (UNEP, 1992).

Atmospheric ozone not only prevents lethal wavelengths of ultraviolet radiation from reaching the earth's surface, but it also filters out 70-90 percent of the less damaging portions of ultraviolet radiation. However, ozone is a minor constituent of the atmosphere.

Although green house gases have been cited as a major contributory factor to the depletion of the atmospheric ozone, two other factors thought to affect the atmospheric abundance of ozone are quasi-biennial oscillation and the 11year solar cycle. These two phenoma may reduce the rate of ozone destruction but the reduction do not compensate for large-scale destruction being triggered by emissions of man-made chemicals.

Effect of ozone repletion on society

Pallisa is part of the global community and hence the harmful effects of the ozone depletion deserve mention. Ozone layer deletion poses many serious threats to human health and planetary life. As the stratospheric ozone thins, relatively more of the harmful wavelengths of ultraviolet radiation will reach the earth's surface District welfare will inevitably experience the following effects:

(a) Ultraviolet

As the stratospheric ozone diminishes, proportionately more of the ultraviolet radiation reaching the earth's surface will increase alarmingly. This change in ultraviolet wavelengths will seriously affect all the planets life forms. As the ultraviolet radiation shifts more towards 280-Nm wavelength, DNA damage increases markedly, as do other harmful effects on plants and animals.

(b) Immune system and vaccination

Ultraviolet radiation suppresses allergic reactions of the skin and profoundly affects the immune system particularly skin cells, whereby it is the body's first line of defense against infection is affected. In fact global warming will add to the problems of infectious diseases. As the climate warms disease-carrying insect, such as malaria mosquitoes, will be able to survive in higher altitudes and latitude.

(c) Skin cancer

The combination of increased exposure to ultraviolet radiation, and the capacity of this radiation to suppress the skins immune system defense, will mean much higher rate of skin cancer.

(d) Increasing eye damage

Cataracts and blindness are expected to increase with further ozone layer depletion. In 1985, the World Health Organization estimated that cataracts were responsible for 17 million cases of blindness (UNEP, 1992).

(e) Impacts on plants

Increased ultraviolet radiation will disrupt many District eco-systems on land. Rice production, a major source of the districts income, may be drastically reduced by the effects of ultraviolet radiations on nitrogen assimilating activities of microorganisms. Tiny organisms such as cyanobacterial, play an important role in providing nitrogenous material for ecosystems by fixing atmosphere nitrogen dissolved in water something that higher plants cannot do.

This group of organisms is adversely affected even by the current level ultraviolet radiation. Hence plants and more especially forests are threatened by increased ultraviolet radiation.

(f) Increased pollution

Ozone is a toxic gas, and its presence in the lower atmosphere contributes to air pollution. If stratospheric Ozone diminishes, the extra ultraviolet radiation reaching the troposphere will cause increased chemic reactivity- and therefore pollution- in both urban and rural areas is likely to increase in the district.

(g) Damage to materials.

Ozone depletion and its resulting increases in ultraviolet radiation will cause many materials to degrade more rapidly. The effect will be wide spread. Polyvinyl chloride (PVC) slings, window and door frames, pipes, gutters and trims used in building are likely to degrade faster, a long with cable coverings, poly carbonate and acrylic glazing and coatings.

Uganda response to the control of ozone depleting substances

a. The Ozone protection unit (OPU):

This unit within NEMA ensures the effective liaison with relevant institutions and routinely monitors the consumption and use of ozone depleting substances in Uganda. It has the responsibility of enhancing government awareness and information exchange programmes on ozone depleting substances.

b. Recovery and recycling of refrigerant.

There is a programme at the national level to train refrigeration and air conditioning technicians and engineers in the recovery and recycling of ozone-destroying refrigerants. However this programme has not been effected in Pallisa District.

c. National refrigerant management plan:

This was prepared by the government as a basis for designing and implementing an overall and integrated strategy for cost-effective refrigerant maintenance sector.

d. Uganda National Association of refrigeration and air- conditioning (UNARA)

This association has been formed to bring together all refrigeration and air conditioning workshop owners, technicians as well as firms which impart, install and service refrigeration and air conditioning equipment and systems.

e. Public awareness and outreach.

The UN general Assembly proclaimed 16th September the international day for the preservation of the ozone layer. This was to commemorate the date on which the Montreal protocol on substances, which deplete the ozone layer, was signed in 1987.

f. Regional level initiatives:

These were established as a result of the UNEP ozone programme to assist developing countries to implement the Montreal protocol.

g. The international scene:

Uganda was elected a member of the executive committee of the multilateral fund for the implementation of the Montreal protocol (NEMA, 1997).

In conclusion, the deletion of the ozone layer is closely linked to, inter alia, the global warming phenomenon due to green house gases. These as foresaid, have adverse effects on the climate. The district, however, will greatly benefit from the initiatives taken at national level. For example the adaptation of the UN framework convention on climate change (UNFCC) in addition to the measures outlined above. The major objective of this convention is to regulate the levels of greenhouse concentration in the

atmosphere, so as to avoid the occurrence of climate change at a level that would impede sustainable economic development, or compromise initiatives in food production. Uganda has completed the greenhouse inventory and vulnerability adaptation studies have been carried out and the “Enabling activity project” was under taken (NEMA, 2002). These are measures that will benefit the district since the majority of the district populace depends on favorable climatic conditions owing to its reliance on rain fed agriculture.

SOCIAL WELFARE AND ENVIRONMENT

The Environment is a complex system comprising bio –physical, economic and social components with increasing concern for the environment there is now an acceptance of a strong link between environment quality and the health status of human population living in an area environmental is that aspect of public health concerned with all factors circumstances and conditions in environment that can extent influences on human health and well being, poor living and working conditions expose people to physical chemical and social factors that may have their health. Also people though their endunour to sumive, do influence the environment often quite negatively. The living coping mechanisms their further contribute to the detoriation of environmental quality improving the quality of life and human capital of the poor is as important as increasing the acquire, as the PEAP recognizes the provision of the basis Semites to the poor, pantilicanty health care, safe water supply and education, they are the basis requirement for poverty emaciation what happens to the environment, finally is crucial to sustainability of poverty reduction and the quality of future generation.

A number of environmental factors influence the health of the people in Pallisa, which make it difficult to isolate which of them are responsible for cases of particular illness or even death. Compounding the problem is the unreliability of status ties of diseases a rising from the failure of many sick people to seek treatment from hospitals. Health is a state of complete physical mental, and social area being is directly or indirectly affected by what happens racially in the environment the complete state of health cannot be attained without a health environment because the main assaulted of good health is the health environment checf. When the health is affected the ability of people to manage their environment automatically becomes under mind this reneals that there is a very close linkage between health and environment.

The living and non living diseases agents that affect health are either air land or water bone and are transmitted by various vectors that are found in the environment and man though his endenour for survival also influence his environment negatively of positively.

A health environment does not stop provision of clean air clean water proper sanitation proper nulution, social economic production system and consumption patters that do not have the physical social and biological

Environment therefore proprances that air at improving health condition for a healthy population in Pallisa District should be more concerned at provision of clean and healthy environment though improved hygienic and sanitation.

The main causes of mortality and morbidity in Pallisa District are environmental in nature since they are caused by living and non living agents in the environment such as poor sanitation and hygiene poor feeding habits, it in therefore not surprising that malaria, diarrhea and malnutrition are among the top 10 causes of mortality in Pallisa. The average distance to a shortest facility is (10 km) the distance to a shortest climate is (5km) and the ching shop is (3km) and the longest for the hospital is (25km) there has been proliferations of health clinic s in Pallisa this may party explain why those seeking medical care prefer either self treatment (using dry shops) or visit private clines (because there are nearest their homes. The data shows that in terms of accuse rural areas of Pallisa where the majority of people lines are disadvantaged in that they inance long distances to health facilities in all counties, private chines and dry shops they are most early accessible.

PALLISA DISTRICT HEALTH FACILITIES.

FACILITY STATUS	NUMBER	GOVERNMENT	NGO
Hospital	1	1	0
Health center I	3	2	1
Health center II	18	13	5
Health center III	10	5	5

The geographical distribution of health personal, just like health units does not reflect, the actual needs however concerted effort are being made to reverse the station especially though the involvement of NGO's and other country based organization.

STAFFING AND TARGET POPULATION

The medical staffing position of the district keeps charging.

Category	Number	Population Ratio
Doctor	8	59,200
Mid	41	2657(mother in child bean)
TBAS	165	2,168

The broadest inchealor which measure human health such as life expectancy at birth and mortality among children under 5 years and infants under 1 year have regressed a lot to implement, following the economic political and social problems the district has been facing incidences of death from the most common immunisable diseases (measles tetanus, tuberculin, whopping cough diphtheria and pollomyecetis) have reduced greatly, health programs implement by the ministry through different agent have registered some positive tends such as mortality rates despite of there implement, people in Pallisa are generally exposed to a number there health disease permanence

is a good inclinator of the state of affan as far as environmental health community is concerned.

S/N	INDICATOR	DISTRICT (2000)	NATIONAL	IDEAL
1.	Immusation BCG Coverage DPT3 Measles	106% 60% 50%	81% 61% 59%	90% 85% 85%
2.	Pit latrine coverage	64%	49%	100%
3.	Proposition of parishes with health units	34 parishes out of 82		One health unit/parish
4.	Proportion of theatres and doctors houses built and completed in HSD	1 theatre		1:1 (one theatre/parish
5.	OPD utilization rate	0.651	0.6	1
6.	HIV zero prevalence rate	3.2%	8.5%	0
7.	T.B treatment completion rate			
8.	No. of new cases of a cute flaccid paralysis	0	0	0
9.	Ante natal alimented rate	124%		100%
10.	Coverage of pregnant women with presumptive	Not started	Not started	
11.	% Of deliveries taking place a health facility	25.4%		100%
12.	FP new acceptors	3.4%		
13.	% Of planed out reach actuates conducted			
14.	Proportion of HC's at least with min staffing worms	0		100%
	1. % Of agreed finding allocation received at district level	89% 2000/2001		

FOOD AND NUTRITION.

In Pallisa crop production denials the District Agricultural activities, almost 70% of farm holdings are engaged in crop production as a principle activity and about quite a big number involves in mixed farming, Pallisa farmers grow both food and which is cindered as cash crop the main food crop include cereals (maize, millet, and sorghum); Legines

(beans, field peas; cow peas); groundnuts and Soya root crop (sweet and Irish potatoes, cassava and yams.

Fishing is also an economic activity that is under taken seriously in Pallisa District people always afford fish to supplement it with other types of foodstuffs.

Where forces of demand and supply operate people are forced to go to the market to prerelease for agriculture products to maker there substantic needs met but there is no tropical data about diet for the people of Pallisa. It is just assumed that people of Pallisa are exposed to various varieties of Agricultural produce and other varieties to meet up the choices.

However maturations ranks among the tem top killer in Pallisa about 2% of the death in children under 5 years of age one due to melodically –related cases the most common malnutrition disease among the under fives in Pallisa are Kwashiorkor, Marasmus shorted growth and under weight. Malnutrition can lower child's immunity, making it more susceptible to diseases such as charheo, measles and respiratory infection. Stunted growth 5 years and more shorted in rural that shorted growth reflected chronic under nutrition, while wasting reflects acute under nutrition and under weight nutrition. Malarial under

ENVIRONMENT DISASTER

Disaster are events that occur when significant numbers of peoples are exposed to extreme events to which they are vulnerable, with resulting injury and loss pf life, often combined with damage to property and livelihoods.

Disasters, commonly leading to emergency situations, occur in diverse situation in all parts of the district, in both sparsely populated rural and densely populated urban areas, as well as situations involving man-made and natural hazards.

Emergencies

An emergency is a situation or state characterized by a clean and marked reduction in the abilities of people to sustain their normal living conditions with resulting damage or risks to health, life and livelihoods. Disasters normally cause emergency situations, both directly and indirectly. Evacuation or other necessary step taken to avoid or flee from a disaster, for example, can cause disruption of normal life on a scale calling for emergency actions. Dramatic loss of livelihoods and increased spending places people in a very vulnerable situation. In an emergency local coping mechanisms are over whelmed and so collectives. Specialized and often external action id requested (WHO, 2002).

Vulnerable to disasters and emergencies

Vulnerability is the degree to which a population, individual or organization is unable to anticipate, cope with, resist and recover from the impacts of disasters (Blaikie el al 1994). Vulnerability represents the interface between the exposure to physicals threats, coming from a combination of social and physical processes (UNEP, 2002 a).

Some disaster may involve extreme events that affect a vulnerable population directly, such that their livelihoods and lifelines that support their basic needs are disrupted for a significant period of time. However, the disruption of livelihoods may also be indirect and, even though an emergency, situation may not develop, people's vulnerability to future disasters may be increased.

Vulnerability is a function of susceptibility (the factors that allow a hazard to cause a disaster) and resilience (the ability to withstand the damage caused by emergencies and disaster and then recover).

The concept of vulnerability helps to identify those members of the District population who are most likely to suffer directly and indirectly from a hazard. It is also useful in identifying those who are more likely to suffer long-term disruption of livelihoods and lifelines, as well as those who will find it more difficult to re-established patterns of living (WHO, 2002). The prevailing poverty in the district is a major contributor to vulnerability. In many situations, women and children are most vulnerable to disaster emergencies. This has important implications in defining vulnerability reduction.

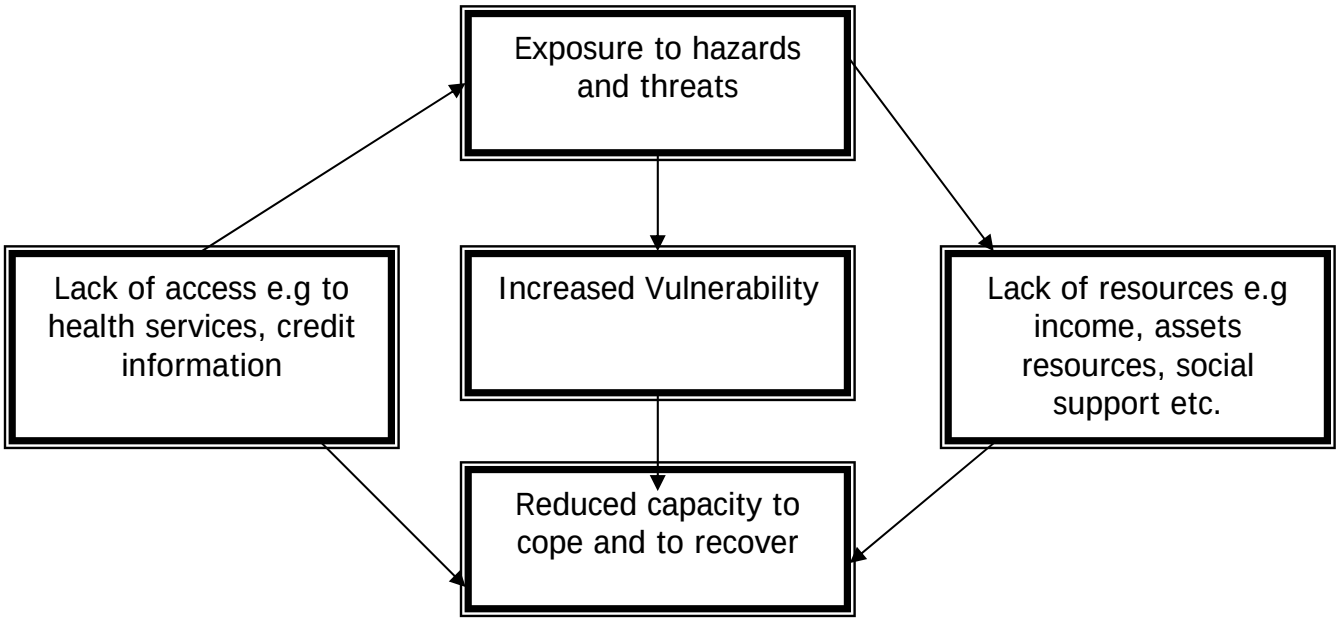
The main indicators for of vulnerability as are as follows: -

(a) High susceptibility communities under this category include those living on flood plains, low-lying islands, are those living near industries that discharge on use radioactive dangerous chemicals.
(b) Low resilience; Communities with a high prevalence of environmental health-related diseases may be more at risk t o disasters than others.

Anderson and Woodrow (1989) identified the following capacities that undermine resilience to disasters and which themselves can be diminished by disaster

- Physical/material capacity command over physical and financial resources.
- Social/organizational capacity support networks in the community and extended family.

- Attitudinal/motivational/physiological capacity- how people feel about their ability to cope



Natural disaster in Pallisa District.

Although natural disaster cannot be prevented, sustainable utilization and management of the environment can increase coping capacities at community level (UNEP, 2002 b. SOEP 2002). There are important links between the physical and social processes that determine vulnerability to disasters. Improper land use and land development can increase the physical magnitude of hazard. In Pallisa District, deforestation provides or classic example.

Many rural people in the District due to low incomes, convert trees into charcoal and fire wood. Denuded of vegetation, the land is less able to absorb rainfall, the land becomes increasingly prone to drought and, because of the increased run-off of water and soil erosion, flooding is increased down stream water storage capacity for the next periods of drought has been reduced, this increasing peoples vulnerability. Below are some of the most common disaster in the
District.

Droughts

Drought and enhanced desertification is a real phenomenon in Pallisa District, although it is not yet perceived, as a serious problem. Drought is a situation of protracted departure from the normal water availability, a water deficit long enough to cause discomfort or harmful consequences (NEMA, 200). Such a situation has occurred in many parts of the district with increasing frequency. It is normally marked by poor rainfall and crop failures. The direct results of this phenomenon are famine; the most recent examples are the famines of 1994 and 1997.

FLOODS.

The occurrence of floods is not very common in Pallisa District except during the Elnino phenomenon. Elnino is Spanish for Christ's child. It is a seasonal change in weather patterns over the Pacific Ocean.

Between 1997 and 1998 the District experienced damaging climatic events that appeared to be linked to the exceptionally strong occurance of the Elnino phenomenon. Outbreaks of water-borne diseases in particular cholera and malaria respectively in many parts of the district led to the death of many people. Note worthy also was the damage to both trunk and rural feeder roads. The roads became impassable and others were damaged beyond use. There was also mass destruction of crops and the District faced an onset of famine: These adverse weather conditions affected agricultural production in rural areas and urban food prices soured especially in Pallisa town.

Earth quakes

The District, like many parts of the county is not an earthquake prone District (NEMA, 2002).

Disease Epidemics.

The major epidemics that have affected the district in recent times are HIV/AIDS and Malaria. The effect of disease epidemics is to damage the social fabric of the community affected; damage the agricultural and industrial production by robbing the District of the most productive age group; undermine social, political and economic stability; and

contribute to insecurity (WHO, 2002) HIV/AIDS, all in all is the greatest challenge to the District health system.

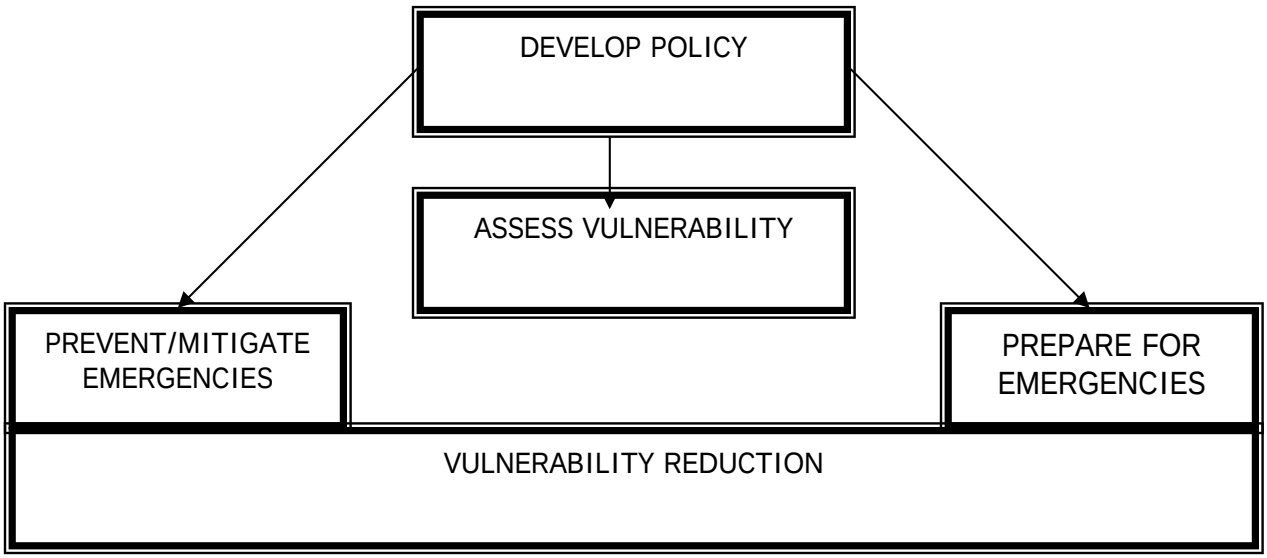
Civil strife and armed conflict.

The District experienced a period of insurgency between 1987 to 1989, which was worsened by cattle rusting by armed Karamajong. Although these events exacerbated poverty and human suffering in the District, the District has slowly been recovering and improving on its natural resource base supplemented by Government Projects like Northern Uganda Social Action Fund (NUSAF).

Step in improving coping mechanisms and disaster management.

Work done in advance of possible emergencies and disasters is an essential part of disaster management. It leads to the reduction in the number and severity of disasters, through prevention and mitigation, as well as emergency response through preparation and planning. Although prevention/mitigation and planning /preparedness are presented separately here, in practice they are interdependent and often have over lapping activities and aspects of the overall goal of vulnerability reduction. A number of model have been adapted but the model recommended is as illustrated in figure below:

VULNERABILITY REDUCTION



SOURCE: World Health Organization (1999 a)

The step outlines in figure above are explained below: -

1. Policy development:

Policy development is needed at national regional /District and local levels to ensure that common goals are used. Without a shared disaster management policy that applies to all relevant sectors and all levels, prevention, preparedness and response are likely to be fragmented, badly coordinated and ineffective (World Health Organization, 1999a). Development and monitoring polices for disaster management requires an active process of analysis, consultation and negotiation. There should be consultation among a wide variety of institutions groups and individuals. The resultant policies should reflect society's definition of the limits of acceptable risk and its commitment to protecting vulnerable population

2. Vulnerability and capacity assessment

Vulnerability and capacity assessment (VCA) also commonly called risk analysis or threat analysis is important in identifying hazards and their possible effect on communities, or organizations and their capacity to prevent and respond to disasters. Vulnerability assessment informs strategies for reducing the vulnerability of development programmes to disruption: It enables emergency prevention, mitigation and preparedness measures to be carried out effectively; It facilitates rapid and relevant emergency response, based on an understanding of gaps in the resources that need to be filled with external support: it provides information on possible/likely damage and operating difficulties; and it provides a picture of the pre-disaster situation to enable appropriate objectives to be set for recovery programmes (World Health Organization, 2002).

3. **Prevention and mitigation**

Prevention and mitigation can be carried out through the following ways:

(a) Reducing community vulnerability through long-term environment health improvements:

In the poor rural and urban areas in the District, improvements in water supply and sanitation systems are connected with vulnerability. First, they reduce the risk of epidemics like malaria and cholera. Second, the improve the health status of the population, making people more resilient when they face the extra stress of disasters. Third, water and sanitation self-help projects often strengthen cooperation within the communities that can be used as a basis of other vulnerability- reduction activities.

(b) Environmental safety regulation:

Legal and administrative controls can a play a significant role in reducing environmental health risk during some emergencies. However, without adequate inspection and vigorous enforcement, their effectiveness will be reduced. Zoning and land use planning are another area where rules and regulations can dramatically reduce risks in the District. However these are difficult to enforce since the majority of the people in the District are poor and have no choice of where to live or hoe to earn a living.

(c) Reducing the vulnerability of environmental health infrastructure

Vulnerability can be reduced through the location, design and maintenance of environmental health infrastructures. Hazard mapping may reveal quite straightforward risks e.g a water treatment plant situated in a flood plain. How ever the decision concerning the appropriate action to take may not be equally straightforward. It may involve the cost of relocating or protection of the facility and the extent of damage threat poses.

4. **Preparedness and planning**

(a) The emergency planning process: This section is concerned with planning to respond to disasters rather than planning to mitigate and prevent them. All agencies dealing with planning to respond to disasters rather than planning to mitigate and prevent them.

All agencies dealing with environmental health should know before an emergency occurs how the following tasks are to be carried out:

- Liaison with other health departments /organizations and with the appropriate emergency coordinating body

- The evaluation of immediate public health conditions and risks:

- The evaluation of damage to public sanitary installations and provision of advice and remedial measures.

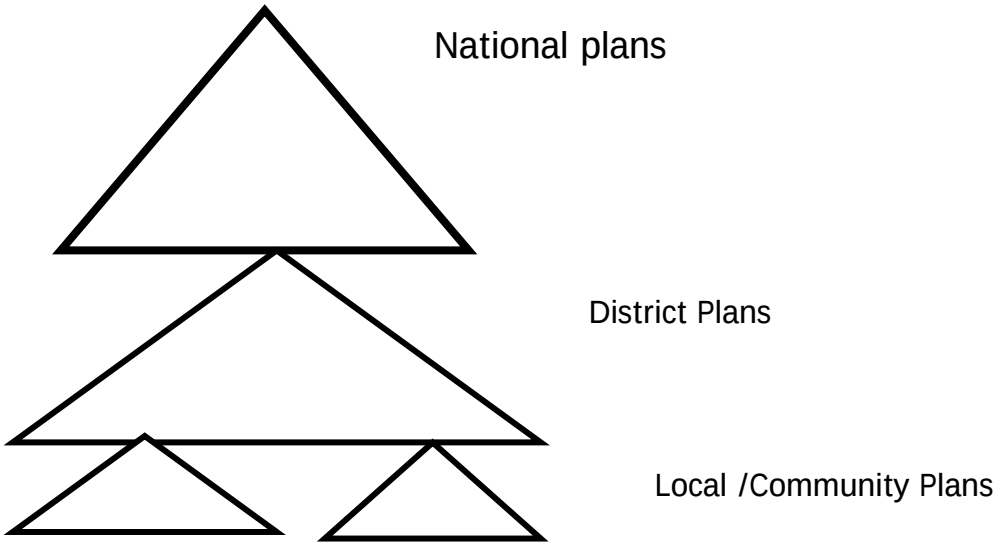
- The evaluation of shelter and food needs.

- Mobilization of personnel and equipment.

- Emergency action to control eliminate environmental health hazards

- The emergency restoration of water supply and waste-disposal systems etc.
- Reporting on conditions and on the measures taken

The hierarchy of disaster management plans



Participatory methods of planning are desirable to ensure community cooperation and acceptability of the plan people must be involved from the start of the planning process. This means listening to people in the community concerned with the disaster management plans.

CHAPTER THREE

POLICY RESPONSES

Pallisa District is endowed with a good natural resource base and generally a favorable climate with the majority of the population depending on agriculture for livelihood. Despite this high resource potential, factors such as population growth, economic reforms and the desire for a steady increase in per capita income and other processes of the development are putting severe strain on the natural resource base and consequently the environment. This strain is characterized, inter alia, by increased soil degradation, deforestation, loss of bio-diversity, reduced rangeland carrying capacity, fuel shortages, increasing population and the incidence of environmentally related diseases.

The inadequate enforcement machinery of existing policies and laws combined with lack of inter sectoral coordination has also contributed to the degradation of the environment and depletion of the District's natural resources. The complexity of environmental problems requires a comprehensive and coordinated policy and legislation. Viewed within this context, Government through the NEAP process has provided a policy strategy for integrating environmental concerns into the district socio-economic development planning process. The District has completed the formulation of the Sub-county Environmental Action Plans (SEAP) and is in the process of developing the District Environment Action Plan (DEAP) as a way of complementing the comprehensive

national environment management policy. The policy promotes the use of economic instruments, public participation and environmental information and education.

Uganda as a country has had other policy responses to address environmental issues. Many new policies, strategies and action plans, laws and regulations have been introduced. Uganda is also party to several multilateral and regional agreements. The county has a very progressive constitution, which provides for the right of every citizen to a clean and healthy environment. The national dream known as "Vision 2025", the comprehensive development framework (PEAP) and the plan for modernization of agriculture (PMA) explicitly includes the concern for environmental issues. Since most of these policies, strategies and laws are still on paper, one needs to be assured of the positive effects on the environment and whether they are sufficient. This is because the focus of policy questions is beginning to shift towards the policy response itself that is, what is being done? Is it adequate? What are the alternatives?

It is unfortunate, however, that quantitative assessment of success or failure of policy initiatives and development in the District is an up hill task. Global experience indicates that implementation effects and sufficiency are particularly hard questions to answer due to: uneven monitoring, poor and missing data, lack of indicators and continuous reporting, and data on environmental situation before and after implementation (UNEP 1999). Furthermore there are no proper mechanisms methodologies or criteria to determine which policy contributes to which change in the state of the environment. Such problems prevent valid comparisons between the current situation and what would have happened in the absence of any policy action. Consequently a more complete and precise analysis will require the development of better mechanisms for monitoring and assessing the effects of environmental policies on environmental quality (SOER Uganda 2000/2002).

POLICIES, LAWS AND INSTITUTIONS

During the pre-colonial era, all members of society had equal access rights over forests, pastures and water resources through the system of communal tenure. In addition every member of society had full rights over the products of one's labour (Kamugisha, 1993). The colonial administration, according to the same author, ushered in a disruptive era at the turn of the century by introducing complex laws and policies whose purpose was to regulate the indigenous peoples relations with the environment. When Uganda gained independence, most basic laws and policies governing the environment remained virtually intact except for some minor cosmetic changes (Kamugisha, 1993). Most laws were generated towards specific resource users, and the interrelationships between them were not strongly emphasized. It is in this context that the government of Uganda sought and made significant environmental policies, legal and institutional reforms.

Environment Policy Reforms

The National Environmental Management Policy (NEMP), formulated through the NEAP process and adopted by the Government in 1994, is a major cornerstone of Uganda's

environmental management. The overall policy goal is "sustainable social and economic development which maintains or enhances environmental quality and resource productivity on a long term basis, that meets the needs of the present generation without compromising the ability of future generations to meet their own needs".

In this context, the National Environmental Management Policy sets the overall goal, objectives and key principles for environmental management; provided a broad policy framework for harmonization of sectoral and cross-sectoral objectives, principles and strategies; transformed existing environmental management systems to establish an integrated and mult-sectoral approach to resource planning and management by creating a National Environment Management Authority (NEMA); promoted positive behavioral/attitudinal change in resource use; provided a basis for formulation of a comprehensive environmental legal frame work; established an effective monitoring and evaluation system as well as an environmental impact assessment process and standard mechanism; and provided for an effective information management system to facilitate collection, storage, analysis and dissemination of environmental information among others.

TABLE: KEY ENVIRONMENTAL AND OTHER SECTORAL POLICIES

POLICY	GOAL(S)
The Environment Management Policy 1995	Sustainable social and economic development which maintains or enhances environmental quality and resource productivity on a long-term basis that meets the needs of the present generations without compromising the ability of future generations to meet their own needs.
National Policy for the Conservation and Management of Wetlands Resources 1995	• Establish the principles by which wetlands resources can be optimally used now and in the future. • To end practices which reduce wetlands productivity. • To maintain the biological diversity of natural or semi-natural wetlands. • To maintain wetlands functions and values.
The Draft National Soils Policy for Uganda 2000	• To streamline soil management methods (framework). • To improve and maintain soil quality and productivity on a sustainable basis.
Water Policy 1995	To sustainably management and develop the water resources in a coordinated and integrated manner so as to secure/provide water of an acceptable quality for all social and economic needs.
Wildlife Policy 1995	• To conserve in perpetuity the resource within the

	national parks and other wildlife areas, and to enable the people of Uganda and the global community to derive ecological, economic, aesthetic, scientific and educational benefits from wildlife. • To generate revenue to support these conservation efforts and hereby contribute to the national economy.
The Draft Forest Policy 2000	An integrated forest sector that achieves sustainable increases in the economic, social and environmental benefits from forests and trees by all the people of Uganda, especially the poor and vulnerable.
The Draft National Fisheries Policy	To ensure increased and sustainable fish production and utilization by properly managing capture fisheries, promoting aquaculture and reducing post-harvest losses.

Source: SOER 2000/2001

Several other policies have been developed after or in line with the comprehensive NEMA; for example, the National Policy for the conservation and management of wetlands was adopted by the government. Sectoral policies on management of forestry, fisheries and wild life resources have also been formulated and adopted. The policies advocate for the use of environmental assessment in designing resource-based development projects. The water policy, 1995, introduced an integrated, mult-sectoral approach to water resource management within the existing social-economic context. Given the increasing concern about the deteriorating state of forestry in the Country and given the importance of forestry to Pallisa District and its people, the forestry policy provides new directions for the sustainable development of the forestry sector. To respond to the changing context, the Government has launched the Forest Sector Umbrella Programme (FSUP, 1999), a sector-wide initiative to reform the forest sector through policy, legal and institutional changes. The forest policy reform is part of the process and supports the implementation of the policy.

Although Pallisa District has not yet formulated the District Environment policy, it is in the process of formulating the District Environment Action Plan (DEAP) and eventually the District Environment Policy. Both the National and District environment management policies, and the sectoral ones are meant to have well-spelt implementation strategies. Furthermore, action plans translated into investment programmes have been and are being developed to allow the implementation of the policy actions. Some policies have pointed out the revision of existing laws and regulation governing various sectors and creating new ones. Since Uganda has an enabling policy framework at the center, there is therefore, an urgent need for Pallisa District to adopt its own District Environment Management Policies and the requisite by-laws to address environmental concerns.

Legal Reform For Environmental Management

The National Environment Management policy gave rise to the National Environment statute (1995). Other significant pieces of legislation are the Uganda Constitution 1995, the Water Act, the Wildlife Statute 1996, the Tree Planting Act 2003 and the Forest Act 2003.

Under its national objectives and directive principle of state policy, the constitution mandates the Government to promote sustainable development and public awareness of the need to manage land, air and water resources in a balanced and sustainable manner for the present and future generations. The Constitution also mandates the state to protect important natural resources including land, water, wetlands, oil, mineral, flora and fauna on behalf of the people of Uganda. Above all, the Constitution has placed the environment under the fundamental rights and freedoms of all people by providing that every Ugandan has a right to a clean and healthy environment. Other constitutional landmarks include: involvement of the people in formulation and implementation of development plans and programmes that affect them, conservation of bio-diversity and wetlands, enactment of laws to promote environmental awareness and prevent the environment from abuse, pollution and degradation. The Constitution also empowers parliament to make laws that govern ratification of multilateral agreements entered by the president or any other person for that matter. Other novel reforms under the constitution include empowering district and local councils to handle environmental issues, which initially were centralized and vested in the central government and its agencies and departments.

The National Environment Statute

The National Environmental Statute (NES) is a comprehensive environment framework legislation enacted after extensive consultation during the NEAP process. The Statute brings together all sectoral agencies involved in the management of the environment. The forum was created through the establishment of the interministerial committee on the environment. The committee provides policy guidelines formulated and coordinates environmental policies for NEMA.

Also for the first time the NES address all aspects of bio-diversity conservation in a holistic manner. In addition it has focus on wetlands, providing for its management, regulations for use and penalty for default.

The NES provides hitherto unemployed tools of environmental management, such as the requirement for environmental impact assessment before project implementation (reviews and impact assessment) and during operations (reviews and audits). It moves away from formative sanctions and promotes other methods, particularly economic instruments, for environmental Management.

The NES, as a very progressive innovation, empowers the Minister responsible to demand by statutory order any enactment other than the constitution to give effect to any convention or treaty. More still to protect those who may not be aware of their

rights, the NES empowers NEMA or a local environment committee to bring action against or on behalf of other persons. The establishment of local and District Environment Committees have further strengthened the decision-making process and implementation by involving the beneficiary communities.

It has however been contended that compressive and holistic as it is, there still remains problems with its provisions (SOER2000/2001). First it does not cover laws enacted after it. Secondly, although in its progressive years of implementation, the environment law is relatively new and the judiciary is not entirely comfortable with its administration. Thirdly and perhaps, the greatest obstacle to the effectiveness of NES is the change in government policy that favours investors. The balance between conservation and development always swings in favor of the investor. Moreover, lack of regulations and sectoral support is another threat that needs to be addressed. Sectoral managers are still reluctant to surrender their powers for collective effort in conservation. Fifth. The NES provides that every person shall have freedom of access to any information relating to its implementation but this calls for administrative guidelines and commitment on how people's rights to such information shall be exercised.

Environment regulations developed before the NES include:- Environmental impact Assessment regulations 1998, Waste Management regulations 1999, National Affluent Discharge regulation 1999, National Environment, Wetlands, River banks and Lake shores, Management Regulations 2000, National Environment hilly and Mountainous Areas Management Regulations 2000

Since its enactment, the NES has provided a basis for enactment of several sectoral laws through an extensive consultative process, similar to the one of NES itself. These include: The wild life statute 1998; the tree planting Act 2003, the ratification of Treaties Act: the local Government Act 1997: and the land Act 1998. The laws and policies as stipulated are in place but the District has not enacted by-laws to facilitate the implementation and enforcement of the National Environment Statute and other sectoral laws related to environment.

Institutional Reforms

Before 1986 there was no institution specifically responsible for environmental management. The environment was managed at sectoral level. In 1986, the Government created the Ministry of Environment protection charged with the responsibility of coordinating and enhancing natural resource management, monitoring pollution levels, and advising Government on policy and legislative reforms for ensuring sound environmental management. The Ministry was later absorbed into the Ministry of Water, Energy, Minerals and Environmental Protection, which in 1993 became the Ministry of Natural Resources. The adhoc nature of the Department of Environment Protection created in that Ministry did not give the department the profile it deserved in environmental monitoring, coordination, supervision and management (SOER 2000/2001).

As a result of the NEAP process, these institutional weaknesses were identified and consequently the National Environment Management Authority (NEMA) was established to become the principle agency responsible for coordination, monitoring and supervision of all activities in the field of environment. It is located as a semi-autonomous institution in the ministry responsible for natural resources. An inter-ministerial policy committee (IPC) comprising of 11 Ministers and chaired by the prime minister is the spreme organ of NEMA. Another important organ of NEMA is the board of trustees which overseas the implementation and successful operation of the policy and functions of NEMA. The executive Director and Board chairman are ex-officio members of the IPC. NEMA performs its duties through cooperation with other institutions. NEMA is horizontally linked to lead agencies in the environment sector NEMA is also vertically linked to the local government structures, the private sector and civil society.

Under the various sectoral policies and legislation there are lead agencies that are coordinated by NEMA for the purpose of addressing environmental issues. This is done through the environment liaison units (ELUs). The ELUs have the responsibility to develop internal capacity to contribute to sustainable environmental management, collect data and disseminate information and promote environmental education and public awareness in their respective sectors. The ELUs are designated officers of these lead agencies. However, a recent review by NEMA has questioned this individualized arrangement (NEMA, 2000) NEMA links vertically with local governments. The local Governments Act 1997 provides for devolution of governance from the center to districts and lower levels. The District Council is the highest level of governance at sub-national level. One of its roles is the integration of environment issues in the development planning process. The District Council has linkages with the District support coordination unit of NEMA, which provides guidelines for the establishment of district environment committees in consultation with the District Councils. Environment Committees are also established at Sub-county, Parish and Village levels.

The District Environment Committees are expected to ensure that environmental concerns are integrated in the District plans and projects, formulate byelaws, promote the dissemination of environmental information and prepare District state of environment reports annually. Pallisa District has a functional District Environment Committee. However, the capacity of the environment committees at various levels of local government is still weak.

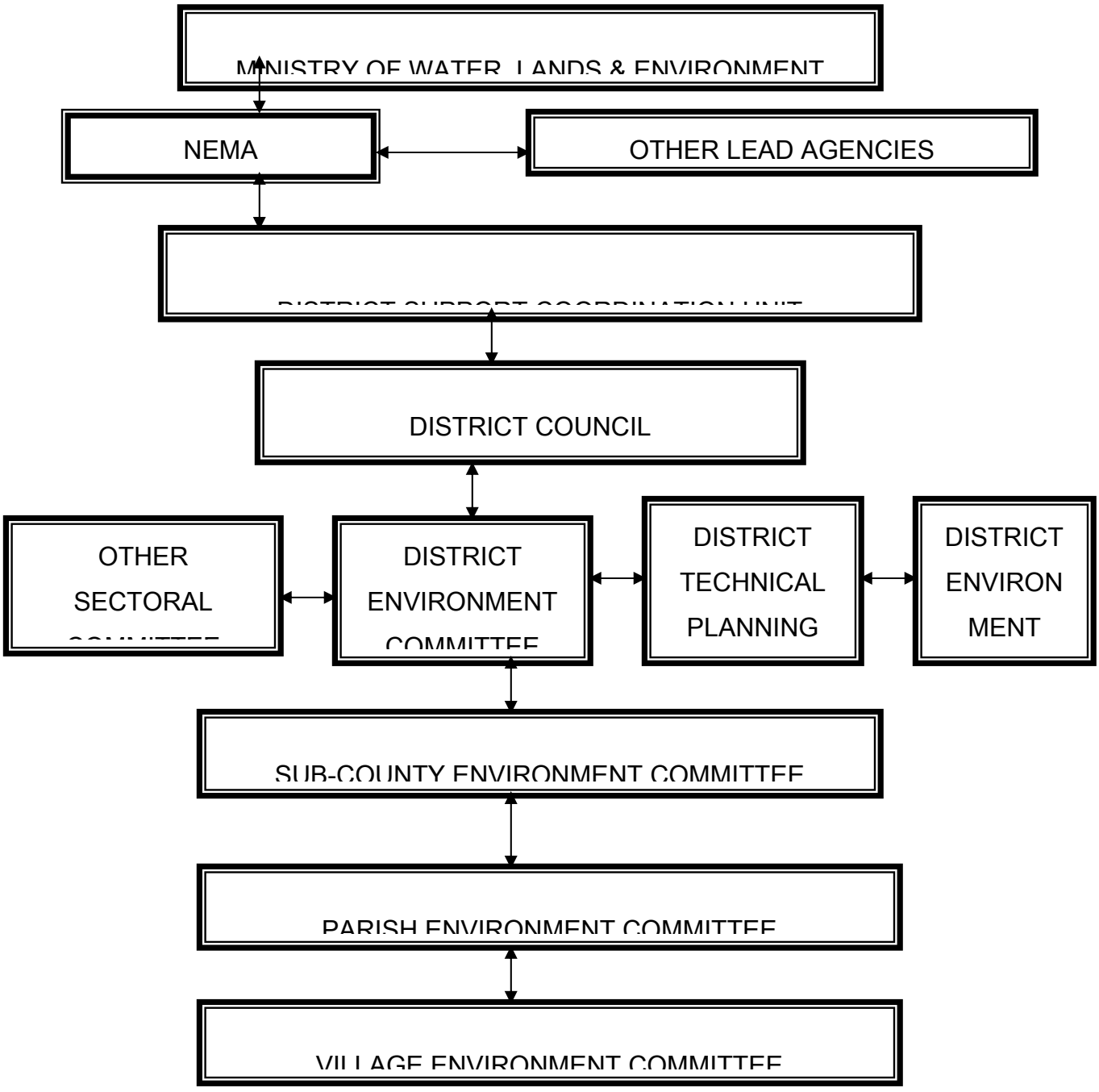
Notwithstanding the foregoing significant improvement in the institutional framework for environmental management, two issues remain unresolved. First, while the NES has made NEMA the highest organ for environmental matters in Uganda, its location within the government structure undermines its prominence and authority. As it is currently located in the ministry of water, lands and Environment it is difficult for NEMA to coordinate environmental affairs in other ministries. Secondly, to date NEMA does not have a sustainable source of funding. It is currently supported through the World Bank's Environment Management capacity building project and other donor-funded project activities. There is therefore, an urgent need to operationalise the National Environment fund provided for in the statute.

Decentralized Environment Management

Environment and natural resource policies have in the recent past evolved from Central Government control and monopoly towards devolved control and co-management (Brinker-hoff and Honadle, 1996). The institutional and administrative frameworks appropriate for these new approaches have lagged behind for a number of reasons: because Governments have been slow to dismantle their monopolies, institutional change is often a slow and threatening process, and capacity gaps take long to fill (Brinkerhoff and Kamugasha, 1998). As a result one gets bi-polar activities at the centre and local levels. Decentralization is one of the strategies that seek to bring together the centre and the grass root levels and give effect to policy decisions to de-monopolize environmental management (Brinkerhoff and Kamugasha, 1998).

Decentralization strategies that reallocated responsibilities to a broader set of partners, not just from a central agency to a local authority are called for in the area of environment. Institutional pluralist and decentralization can result in the creation of triangular relationships among Central Government, Local Governments and civil society organizations which can result in a lower level of win - lose conflicts, a more stable balance of interests, and better performance (Twedler, 1997). According to Brinkerhoff and Kamugash (1998) Uganda is at the forefront of African nations pursuing the decentralization policy. Here below is the structure for the decentralized environmental management in Uganda:-

STRUCTURE OF DECENTRALIZED ENVIRONMENT MANAGEMENT IN UGANDA



Source: NEMA (2000/2001) State of Environment Report, Uganda.

Due to the weak capacities of Districts and lower levels to meet their obligation a number of initiatives have been put in place for capacity building. Pallisa District

benefited from the World Bank's Environment Capacity Building Project (EMCBP) and continuous technical assistance from NEMA (SOER, 1994). Decentralization of environment management is also provided for in the forestry and wildlife policies. The Uganda Wildlife Authority has a community conservation unit within the directorate of field operations. The Forestry Department also has a unit dealing with collaborative forest management. The forest policy advocates for the revision and strengthening of the Forestry Act with particular regard to gazzetting, collective responsibility in management, revenue sharing and local community participation in protected area management (NEMP, 1994).

The UWA has also produced a policy on collaborative management entitled community protected areas institutional policy (UWA, 2000), to develop institutional linkage for managing relations between communities and at the same time enhance community participation in protected areas management.

Economic Instruments

The NEAP process from the early to the mid 1990s identified the inherent weakness and ineffectiveness of the command and control measures hitherto employed to enforce compliance in environmental management. NEAP recommended greater use of economic instruments for better environmental management. Economic instruments (incentives and disincentives) are instruments that affect benefits and costs of alternative courses of action open to economic agents, with the effect of affecting their behaviour in a way that is more favourable to the environment than would otherwise be the case in their absence (SDC, 2000a). An incentive is an instrument that is offered to encourage good practices in environmental management. On the other hand, a disincentives is an instrument offered to discourage practices that are harmful to the environment.

Economic incentive and disincentive can induce the changes in the behaviour of people and other entities more effectively than regulation if a resource can be appropriated at little or no cost. There is no economic incentive for producers to use the resource efficiently or carefully if the product prices are relatively low, there is little economic incentive for consumers to use the products judiciously. The environmental objective with respect to economic instruments is to "ensure that individual, groups and businesses and other economic entities have appropriate incentives and disincentives with regard to sustainable resource use and environmental protection (NEAP, 1995 b). Subsequent evaluation of the various policy instruments after Rio found economic instruments to be among the most powerful policies for improved environmental management (SDC, 2000 a).

Apart from economic tools, other tools for environmental control include environmental laws and policies, environmental standards, regulation approaches, environmental impact assessment, strategic impact assessment, environmental reviews and audits,

public awareness and participation, institutional reforms and strengthening and environmental information.

Uganda has, despite the limited capacity to carry out analytical work, registered some successes in the use of economic instruments in environment management. However, the main constraints facing Pallisa District in the promotion of economic instruments are: limited knowledge and capacity, limited financial resources, low culture for tax compliance, economic obstacles, weak private sector in economic monitoring, and high operational costs by commercial banks resulting into unsustainable interest cost for long-term investments for environment projects (SDC, 2000 b). To overcome these constraints, the strategies that have been identified include, popularizing existing instruments without investing in new ones, expanding the source of green funds, providing grants or concessionary credit, focusing on training districts, encouraging voluntary compliance, involving the media and exposure visits.

LOCAL INITIATIVES

Public Participation

Broad Public participation in decision-making on matters pertaining to the environment is an important element of agenda 21 because combined with greater accountability it is basic to the concept of sustainable development. Different interest groups should be involved in environmental management including children, workers, women business enterprises etc. public participation enables knowledge, skills and resources to be mobilized and fully employed for the effectiveness of Government Policy initiatives to be increased. (NNEP, 1999).

Under the 1995 Uganda Constitution, it is the right of every Ugandan to participate in environmental matters. The same right is embedded in the local government Act 1997 and the National Environmental Statute 1995. For any plan or policy to be approved by cabinet there must be evidence right down to the district, local council and communities. For example the PEAP, the PMA and vision 2025 were formulated through that process. In Pallisa District, decentralization has facilitated participation by the public in decision-making. There is a secretary for production and environment right from the lowest local council. Both the National Environment Statute (1995) and the Local Government Act (1997) create clear avenues for the views of the public on environment issues to be channeled through the local council system, the District Environmental Committee and the District Development Committee and then fully debated in the District Council.

The District continues to carry out public awareness and education programmes to equip the local communities with knowledge on environmental issues and planning procedures. Through open discussions and input right from the village level. Parish environmental Action plans (PEAPs) were formulated. Through the same extensive consultation and

participatory process sub-county environmental Action Plans (SEAPs) were formulated. It is on the basis these Action Plans that the DEAP is to be developed. The District Environment Office will ensure that the views of the communities are genuinely represented in the DEC's report recommendations to the DDC and finally to the DC (NEAP SECRETARIAT 1994).

Environment Information and Education

The NEAP process of the early 1990s recognized the need for establishing an effective natural resources and environment information systems to facilitate the collection, storage, analysis and dissemination of environmental information as a key component for developing a regular monitoring and evaluation programme (NEAP Secretariat, 1993). In order to monitor the dynamics in the quality of Uganda's environment, the NEAP process identified the following core data sets and subsequent efforts to address environmental information has been focusing on them, demographic data, agricultural information and farming systems, energy consumption patterns and availability, soils, water, protected areas and bio-diversity, climate and topographic information, infrastructure and general socio-economic trends, and information on land-use and land-use changes (NEMA, 1999). To fulfill the foregoing, the district Administration and NEMA has facilitated the district Environment Office in the following ways:-

(a) Establishment of a fully stocked environmental resource centre at the district Head quarters
(b) Provision of environmental literature in form of books bronchures, pamphlets, periodicals, charts and other related items.
(c) Provision of a video and Television for the dissemination of environmental related information.
(d) Provision of a computer and printer plus a photocopier for processing data.
(e) Provision of funds and other resources, which have enabled the District Environment Office to create awareness on environmental issues among the populace.

Due to the NES mandate, the district produced an environment profile and a district state of environment report 1998. A part from this particular one several surveys have taken place especially in the wetland sector. There is, however, an urgent need to gather the requisite current data on land use, the forest and woodland cover, wetland land resources and the extent of encroachment upon them, the present fresh water resources, bio-diversity issues and the environment. The capacity of the district to collect and analyze data remains inadequate and it is incumbent upon the District and other stakeholders to offer the necessary technical assistance and resources.

District Development Plans and Environment Policies have a better chance of being implemented effectively when supported by an informed, educated and involved public that generally accepts the need for greater openness and transparency (UNEP, 1999). Pallisa District has greatly benefited from the Universal Primary Education Programme. In line with Government Policy environmental education has been incorporated in the formal education curriculum. It is also a fulfillment of Agenda 21, which urges every country to prepare a national strategy for environmental education.

CHAPTER FOUR

THE FUTURE

Introduction

In 1999, Ugandans reached a consensus on a vision for the future and summed up as "Prosperous people, Harmonious Nation. Beautiful country", (MFPED, 1999). In coming up with this vision, Ugandans examined four possible scenarios or development paths for the future. A scenario is a story, told in numbers and figures, concerning the manner in which future events could unfold and offering lessons on how to direct the flow of events towards sustainable path-way and away from un sustainable ones (UNEP, 2000). Scenarios provide witty gritty of ideas and tools for the formulation of normative goals and structured patterns of development.

After extensive consultation, vision 2025 was formulated with the following development scenarios, the flying crane scenario, the moribund scenario the Ostrich scenario and the peaceful slumber scenario. The flying crane scenario envisages a vibrant economy, with positive impact on all human development indicators on both National and local levels whereby the main National players function in harmony with the National interest, thus creating a stable political environment to nurture economic progress. The moribund scenario on the other hand envisages an extreme end of the scenario spectrum. It envisages chaotic politics and poor governance, poor human development, brain drain, poor economic management and unsustainable levels of external debt. The Ostrich scenario portrays a situation where economic progress is sustainable over the perspective period amidst an unstable political environment. Under this scenario political circumstances deteriorate, economic progress declines yet the leaders bury their heads in the sand against the political circumstances prevailing in the country. Lastly, the peaceful slumber scenario envisages the smooth transition of government, popular grass-root governance and transparency, emergency of Nationalistic and patriotic ideals, capital flight, brain drain, low investment and hostile internal and external shocks.

According to the SOER (2000/2001) Ugandans chose the flying crane scenarios as their most preferred path of development. Similar to Ayenis work (2000) for Africa, below is a summary of assumptions of the flying crane scenario that can enable us better understand the nature of driving forces and their possible impact on the environment.

- ⇨ Neither the Ostrich scenario nor the moribund scenario possesses strategies that are adequate for decreasing the ills of the assault on the environment.
- ⇨ Given the range of treaties and conventions, which Uganda has adopted on environmental issues and is putting in effect, policies alone will not be sufficiently effective against social inequalities and environmental uncertainty.

- ⇨ While Uganda is unlikely to abandon market forces as policy tool, equality, social, cultural and environmental goals are likely to receive precedence in thinking about development.
- ⇨ Ugandans have endorsed the principle of sustainable development, and this endorsement is likely to fundamentally change values and lifestyles of people.
- ⇨ Most likely, there will be a cultural renaissance that will not only be critical of past behaviour and effects on the environment, but will also outlive new ways of thinking and fostering environmental goals.
- ⇨ The increasing number of affluent Ugandans becoming ever more disillusioned with commercialism, other ills of society and the negative impacts of development on the environment will undertake steps to develop new value and value systems which they will gradually introduce and promote a new set of ethics to the rest of Ugandans; and
- ⇨ A new generation of Uganda thinkers and leaders will join and shape National and global dialogue towards environmental sustainability

The foregoing assumption of the flying crane scenario operates jointly and severally on a set of driving forces, namely: demographics, economics, social development, culture, technology, environment and governance. The driving forces and their characteristics adapted from Ayeni (2000) are presented in the table below:-

DRIVING FORCES	DESCRIPTIONS
Demographics	♦ Increased population characterized by a stable demographic structure ♦ Zero growth rate and balance ed age cohort distribution of persons ♦ Population will be dynamic ♦ Decreasing income inequalities minimize transnational migrations and prevent brain drain ♦ Increasing rates of urbanization coupled with ability to fight the evil effects ♦ Harnessing the virtues of urbanization
Economics	♦ The information economy leads to a more integrated world economic system ♦ Information economy impacts both the processes and patterns of industrialization ♦ Privatization of sectors of the economy leads to the stabilization and hence their desirable integration with the global economic system ♦ Marginalization of Uganda by the rest of the world will reduce ♦ Sub regional blocks will be strengthened and will set to minimize regional inequities ♦ Multinationals will dominate the modern economics, which will be characterized by rising incomes and reductions in levels of poverty

	♦ Foreign investments especially through multinational companies and through processes of privatization will increase and replace foreign aid ♦ Move from an era of total dependence on natural resources through sustained programmes of diversification of the economy and through industrialization within the framework of information technology
Social development	♦ Improving levels of human development ♦ Minimization of disparities in human development between sexes, and within the country ♦ Increasing ability to tackle the HIV/AIDs epidemic as well as other endemic diseases ♦ Introduction of social development policies to foster good family relations and change social concerns of persons ♦ Introduction of social reforms that guarantee access to land and public facilities and to modern infrastructure ♦ Introduction of policies that stabilize families and reduce the gaps between urban and rural areas ♦ Enthronement of the legacy of social reasonability to the environment
Culture	♦ Convergence of cultures to western life styles ♦ Western values overshadowing African cultures ♦ Effective utilization of the mix of cultures will lead to healthier life-styles and promotion of alternatives ♦ Replacement of traditional family ties that are breaking down ♦ Elimination of region and ethnicity as a divisive force in Uganda's development
Technology	♦ Improved information technology infrastructure as the basis for the new development strategy ♦ Creation of opportunities in business, commerce and industry ♦ Integration with the African nations and with the rest of the world ♦ Economic integration with African nations ♦ Biotechnology will provide increasing opportunities to meet the food and drug needs of the peoples of Uganda ♦ Marginalization decreases over time as information technology leads to a rapid catch up ♦ Information technology will provide the basis of modern industrial development Uganda will for once be able to realize its dreams of industrialization as a strategy of development ♦ The emergencies of micro-power technologies will be assisted by modern information ♦ Technology and will revolutionalize the source of energy needs of Ugandans ♦ Ability to recognize the sequence of timing that is essential to harness good technology and integrate this into the process of development ♦ The introduction of element fuels and the culture of a greater concern for the environment will reduce the negative process of development ♦ The introduction of cleaner fuels and the culture of greater concern for the environment will reduce the negative impacts of industrialization on the environment
Environment	♦ Uganda will willingly enforce international environmental treaties ♦ The emergence of civil societies and non-governmental organizations will assist to enforce international treaties ♦ Unsustainable use of natural resources and environmental degradation will decline ♦ Biotechnology will lead to great improvements in the food production chain

	♦ There will be hope of self-sufficiency in food production ♦ Unsustainable agricultural practices and increasing use of marginal lands will decrease as a result of improved database will exist for the settlement of disputes ♦ Better urban management practices will eliminate strains and assaults on the urban environment people will appreciate the importance of better cities and better environments ♦ Sustainable
Governance	♦ Privatization will be the dominant force in restructuring basic services ♦ Privatization will lead to greater efficiency and the elimination of incessant problems association with the provision and distribution of services and facilities ♦ There will be a greater level of cooperation between Uganda and the rest of the world in a single world economic system ♦ Institutional reforms will strengthen governance while the influence of civil societies will increase and will serve as checks on the excesses of national governments ♦ Local participation in decision making will increase considerably ♦ Reduction of conflicts in most countries through assistance to provide basic services and through breaking of the poverty trap

Operationally, its incumbent Upon Pallisa District authorities to ensure that the strategies aimed to achieve development under the flying crane scenario are locally owned and initiated. It must be supportive, nurturing and people intensive. The district must further decentralize all relevant institutional functions and become truly grassroots – oriented, multiple, dispersed and pluralizing. The district should in short continue borrowing ideas from elsewhere. The crystallization of these ideas shall be a major force for accelerated environmentally sustainable development for Pallisa District.

Trends Of Key Environmental Issues In The District

Over 90% of the people in Pallisa District make their living from the products and services of the district soils, water and biota. However the interaction between society and the environment are very complex; the condition of the environment bears directly and widely on the district human productivity and vice versa. In the District's quest to increase productivity, various socio-economic activities have greatly affected the state of the environment.

Particular processes that have been unleashed include deforestation, soil degradation, loss to bio-diversity, and drainage of wetlands, pollution, and general emergency of unsanitary conditions. These processes and so many others continue to degrade the natural resource base and the environment in general. This sub-chapter therefore sets out to examine this deteriorating state of affairs.

Land is by far the most important natural resource as more than 90% of the population in rural areas directly depend on land for cultivation and grazing. However, the current patterns of land management and utilization as well as increasing demand for land presents numerous environment problems. The most serious of these is soil

degradation, which has led to decline in productivity and agricultural earnings in many areas of the district.

The causes of soil degradation are complex and involve interactions of several factors. One of these factors is soil fragmentation whose notable consequences is over cultivation very often without adequate soil conservation and regeneration measures. Inappropriate farming systems have also greatly exacerbated the situation as the farmers lack knowledge and access to improved agro-forestry systems, capable of renewing and regenerating soil fertility. The other major causes of soil degradation are over grazing, deforestation, bush burning and use of agro-chemicals without appropriate skills and training in pesticide use and application.

Another environmental issue the District is grappling with its loss of forest cover and depletion of wood lots. Deforestation is a manifestation of the extreme pressure on the forest estate. Population increase is not matched by increasing size of arable land has led the local communities to encroach on forest reserves in order to expand areas of cultivation.

It is worthy of note, also, that 90% of the population in the rural areas directly depend on firewood for their energy needs. Demand exceeds supply by 17% in Pallisa District. The short fall is made up by accelerated harvesting/depletion of forest capital. The situation is further exacerbated by pit sawing which is rampant in the district. This practice has led to the depletion of the district's prize wood species such as Mvule (chlorophora excelsa) and Mahogany (entandrophragma Cylindricum).

Another environmental phenomenon worthy highlighting is the wanton encroachment and depletion of the District's wetlands. Wetlands are important as a forest resource (Ambatch wood etc), wildlife resources (situnga intercrop, birds, lung fish etc), Forage, micro phyte resources (papyrus, Typha, Phoenix, Phragmite), agricultural resources and water supply. The major threats to wetland resources arise from human activities. Obstruction of water through drainage results in reduction of the water table. But perhaps the greatest threat to wetlands in Pallisa District has arisen from rice growing. This has created areas of monoculture attracting bird pests and has also led to rapid decline in fertility due to poor management practices where rice is harvested and the straw is burnt. More over repeated and extensive burning of grasses every year to allow for growth of fresh vegetation for pasture leads to changes in the ecological character of wetlands. It is also unfortunate that conservation and sustainable use of wetlands in the District is also constrained by management related factors, namely; inappropriate land tenure systems, unregulated and unplanned fisheries development especially fish farming, and the unscrupulous activities of some developers. The situation is worsened by the fact that available data on wetland is scanty and inadequate.

Under threat is also the water resources. These resources are under threat from two sources; the ever-increasing demand due to population growth and development needs, and the progressive deterioration of water quality due to inversion of noxious

waterweeds, silting and other related factors. The current environmental concerns are the inadequate knowledge of available resources and the demand placed on them for development purposes, the optimal allocation of available water resources to meet demand; and the determination, control and disposal of the consequences of development such as wastes in such a manner that the ecosystem and development are not compromised in time and space.

Fisheries also constitute another important resource to the district in terms of income, employment and nutrition. The net trend, however, is the depletion of fish stock due to increased demand for fish owing to rapid population growth, rapid urbanization and improved transport infrastructure.

A part from the threat of over-fishing, the current fisheries issues and concerns require more efficient research, enforcement, extension and monitoring. To achieve rational and sustainable use, first the physical and chemical and characteristics of rivers, lakes and streams need to be better understood. The impact of traditional fish processing on the environment and on deforestation in particular must be addressed. Due to scarcity of energy, there is predominance of hot-smoking and frying methods of artisan fish processing, which contributes to environmental degradation through the indiscriminate harvesting of fuel wood.

The fast rate of population growth and increasing population pressure on the environmental resources in the district is a cause of concern. At a population growth rate of 19.1 and a population registered between 1980 and 2002 having grown from 261,183 to 522,254, the rate of growth is very high: The seriousness of the issue is that socio-economic development of a fast growing population calls for increased use of natural resources at a level which may not be sustainable given the current management and capital constructs.

EMERGING ISSUES AND PRACTICES

In the widely changing global and national arrangement the district faces a number of development trends, which present challenges and opportunities for environmental management across the district. These include rapid and unplanned urbanization, the growing role of the private sector, decentralization and democratization, sub-regional integration and globalization. Depending on how they are managed, these development trends could prove good or bad for our environment and its future (WB, 2002).

Urbanization is rapidly transforming the district. However this demographic shift is already having a major impact on environmental management challenges and these challenges will grow over the next few decades. Urbanization can be a positive force for the environment when it reduces pressure on overcrowded and ecologically fragile rural areas. However this may not be the case because many immerging towns in the District have been linked to "over grown villages". The over-crowded residents of those urban centres lack the services often associated with urban areas such as piped water, sanitation and electricity. These urban dwellers also remain directly and heavily dependant upon natural resources of surrounding rural areas, including near shore fisheries, forests for wood fuel and building materials and so forth. These diverse concentrations of consumers place an enormous strain on nearby rural areas.

As urban areas grow, the problem of waste management arises. The sink capacity of the environment for wastes is overwhelmed with few urban areas having effective sanitation systems. Untreated sewage is retuned into water bodies that serve as a source of drinking water and a habitat for vital fish resources. Solid waste accumulates around dwellings, leading to disease and high vermin populations. Drainage systems are also often poorly maintained, creating ideal conditions for water related diseases such as malaria and cholera. Inadequate sanitation is a major cause of the degradation of the quality of the ground water and surface water.

The growing role of private sector investment has led to refocusing on its influence on the management of the environment. Many economic improvements associated with privatization can be linked to potential environmental benefits. More efficient use of resources is expected because most forms of privatization introduce more effective corporate governance and management, leading to greater attention to waste reduction, more efficient use of technologies. Moreover, increased exposure to advanced

environmental management and access to markets for environmentally friendly goods and services is an expected benefit of privatization.

Questions, however, have been raised, inspite of the improved environmental performance highlighted above, about the potential negative environmental impacts of privatization in connection with;

(a) The transfer of polluting industries to developing countries seen as “polluting havens”,

(b) The development of previously undisturbed resources (as in new oil drilling or mining activities),

(c) The corrective impact of many small scale polluting operations (such as in urban transport or fuel distribution and retail networks), and

(d) Exceptions from regulatory requirements that are sometime part of privatization (Magda Lovel and Brandford S. Gentry, WB No. 426).

The District may in the future further benefit from environmentally friendly technologies due to globalization. Technology transfer can be a positive outgrowth of globalization as transnational companies can introduce more energy efficient and environmentally friendly technologies to replace antiquated production systems in the District. However, new technologies have historically spread by example and observation and not more transfer perse (Diamond, 1997). There are also risks of introducing potentially harmful technologies, as the on going international debate on genetically modified organisms illustrates.

As the population in the District begins to use commercial energy (fossil fuel and hydro) instead of biomass, there will be reduced pressure on the forest and woodland resources of the District. However atmospheric pollution will increase, as a result of escalating urban energy consumption due to economic growth and greater use of motor vehicles. The use of poor quality fuels, inefficient methods of energy production and use, traffic congestion, poor automobile and road condition and fuel will exacerbate the situation (UNEP, 1999).

Due to population pressure and economic growth more uncultivated land must be brought under cultivation. This additional land is likely to come from rangelands with their own fragility with crops. Also, since the present settlement patterns in the district indicate high population densities around major wetlands, there will be tremendous pressure on these sites unless enforcement and effective policies are put in place

Policies And Laws

The District will need to put in place appropriate policies to govern the rate and level of urbanization if rate and level of urbanization if the District is to avoid the adverse impacts being experienced in other places. Even in the few urban and semi-urban areas in the District today, there are problems of solid waste disposal, garbage disposal including the polythene phenomena that is detrimental to our soils. The beginning point would be to formulate a land use policy and land plans to guide development.

To discourage resource depletion, the prices of the District's natural resources will have to move progressively toward their market values and thereby discourage rent seeking.(SOER 2000/2001).

Policies that encourage better farming methods, land resource husbandry and favourable agronomics practices will be needed in order to raise agricultural productivity with minimum use of agrochemicals. The district should continue to appeal to the government to lobby for the abolishment of agricultural subsidies.

The population policy should be geared at lowering the population growth rate by providing the appropriate incentives. Family planning should be popularized through a deliberate mass awareness programme. The policy should aim at removing the ingrained cultural disposition of producing as many children as possible without antagonizing the communities. The Universal Primary Education Policy is handy in implementing such a population policy because a literate population is expected to be in a much better position to appreciate the benefits of family planning.

RECOMMENDATIONS

Apart from the conventional environmental management obstacles, Pallisa District is faced with a three-fold problem in the management of her environment; first, it is a relatively new District grappling with the difficulty of establishing the necessary infrastructure and institutions for service delivery; second it is among the poorest Districts in the country, and last, the decentralized environmental management phenomena being a new practice, the District does experience the usual pains of infancy. However, the district is endowed with a rich natural resource base. The District Environment Office in conjunction with the entire District administration is at the forefront of implementing the national environmental policies and laws.

A. **Addressing Poverty And Population Growth:**

The major cause of environmental degradation in the district is poverty and population growth, which have not been strictly addressed by the various environmental policies. According to UNEP (1999) resource consumption is the leading driver of environmental degradation. Policy measures should be developed to reduce population growth, upgrade the living standard of the poor and increase sustainability. Dependence on biomass energy is also a contributory factor to the continued degradation of the environment.

The District should in collaboration with other stakeholders take the following measures:-

(1) Raise the awareness of the populace on the linkages between population, poverty and the environment.

(2) Promote of the adoption of energy efficient technology.

(3) Advocate for increased promotion of family planning activities together with increased school enrolment, particularly of the girl child.

(4) Design policies that promote alternative renewable energy sources to alleviate pressure on woody biomass resources.

B. **Design Appropriate Environmental Management Policies And Other Sectoral Policies**

The District has not yet formulated an environmental policy, which has rendered the enactment of byelaws difficult. There is, therefore, a lacuna in the law thus creating a linkage-gap between the national environmental laws and the particular local circumstance obtaining on the ground. Moreover, the implementation of the Land Act has been rendered ineffective owing to the absence of a land-use policy and plan that would have addressed the land ownership and management practices that contribute to environmental degradation. It is, therefore, necessary for the District to do the following:-

(i) Formulate and develop specific environmental management policies to address the unique concerns of the district.

(ii) Encourage the formulation of thematic policies within the District overall sectoral policies.

(iii) Formulate land use policies appropriate for the district.

(iv) Translate district land use policies into land use plans.

(v) Develop suitable indicators for measuring effectiveness of environmental policies.

C. **Strengthen Decentralized Environmental Management**

The District should through cooperation with the Government and the technical input from other stakeholders develop and build a strong environment management capacity. There should also be a concerted effort to support indigenous civil society organizations to become effective participants in environmental management.

The capacities of the sub-county are parish environmental committees should be strengthened in Environment Planning and Management

D. **Improved Use Of Economic Environmental Management Tools**

Economic instruments (incentives and disentives) in environmental management are advocated for in the National Environment Management policy 1994 together with resource pricing strategies and the support macro-economic framework (MNR 1994 B)

There is a need to establish the value of the District environmental resources the answer of which party lies in the benefit streams generated by the environmental goods and services generated by the resources. In addition, without at preparing proper accounts it is not possible to know if the district resources are being utilized sustainably. Moreover, economic growth, though desirable may be taking place at the expense of the environment. There is therefore need to ensure that the District's economic growth is sustainable.

There is a growing necessity to follow the national practice of which favours a sector wide approach for estimating budgetary requirements within its medium term expenditure framework. This therefore calls for mainstreaming of the environment in these plans.

The recommended actions are:

(1) To develop the required economic instruments for environmental management

(2) Determining economic rents (pricing) for timber, fisheries, minerals, land and other natural resource.

(3) To carry out resource valuation (forests, land) as a basis for proper resource accounting and policy formation.

(4) Greening the district accounting and policy formation.

(5) Mainstream the environment into sector wide strategic investment plans.

E. Improve On Data Collection And Management, Acquisition Of Relevant Environmental Information

There is paucity of sound technical data and information on environmental issues in the District, which indeed complicates the task of environment assessments. The District should as a matter of urgency put the following measures in place:-

1 To undertake training of all stakeholders at the district on data collection, processing, storage and pricing.

2 To lobby and seek for financial resources needed for the improvement of monitoring of environmental management and data collection standards,

3 To seek linkage with the NEMA environment Information Network,

4 To promote environmental data quality and opportunities for standardization, and

5 To advocate for a law on access to information including the environment.

F. To Improve On Environmental By-Laws And Standard

NEMA has developed a number of standards relating to noise, air and water pollution among others (SOER, 2000/2001). The district should strictly implement not only these national standards but also develop local guidelines on matters pertaining to the environment. Moreover, as already alluded to, there are no bye-laws in district to facilitate the enforcement of environmental management standards. There is therefore, an urgent need for the District authorities to develop a District Environmental Policy that will guide the concerned local councils to enact the requisite byelaws.

G. Increased Financing.

More and sustainable financing is needed not only for the District environment office but also for other sectoral departments (like water, agriculture, forestry, wetlands, meteorology and fisheries), lower Local Councils and civil society.

The recommended course of action should be:-

1. To make more resources available through, inter alia, resource user fees and pollution taxes to facilitate environmental management.

2. To involve the private sector and civil society in making funds available for environmental management
3. To continue lobbying government and other stake holders for environmental management for additional financial assistance to facilitate environmental management in the District.