IDENTIFICATION OF SOME ENVIRONMENTALLY DEGRADED AREAS IN LAPAI LOCAL GOVERNMENT AREA OF NIGER STATE, NIGERIA

BY

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CERTIFICATION

This project titled :Identification of some Environmentally degraded areas in Lapai Local Government Area of Niger State Nigeria" by Mahmud Ahmed met the regulations governing the award of Post Graduate Diploma in the Federal University of Technology Minna and is approved for its contribution to knowledge and literacy presentation.

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DEDICATION

This project is dedicated to my beloved wife.

ACKNOWLEDGEMENT

I thank ALLAH for giving me the health and strength to go through this work.

My appreciation goes to my able supervisor Dr. A.S. Abubakar and other members of staff of the department for their encouragement.

I must not fail to mention that my wife and little kids have been patient with me throughout the period of my study. I want to say thank you all.

ABSTRACT

Lapai Local Government area is endowed with abundant natural resources especially vegetation and water resources. The Kpashimi Game reserve which is Gazetted could serve as tourist attraction centre with diverse flora and fauna. The land is fertile which has attracted thousands of migrant subsistent farmers from neighouring Local Government Areas and beyond into the area. The situation has led to the clearing of virgin land for the cultivation of crops which invariably implies changing/destruction of the vegetal cover of the area. The impact of this action is of course worrisome as erosion will set in and disfigure the landscape.

Within Lapai town also, the gully erosion menace became serious during the 80s which prompted the construction of concrete reinforced drainages criss crossing the town. The programme then was perceived as a welcome relief. The impact of the drainage downstream is now causing an unintended ecological problem downstream.

These and other ecological problems will be studied to determine the extent of the problem and provide recommendation.

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.0 INTRODUCTION.

.1 Background and Basic Concept.

Man is an important controlling factor in any ecosystem. His influence readily reflected in the destruction and replacement of the ecosystem. estruction of the ecosystem by man is a result of his need for land for arious purpose, such as agriculture, cattle rearing or the exploitation of ertain natural resources. Another example of the effect of man on the cosystem is the introduction of plants and animals, which through their ggression make a place for themselves at the expense of the native fauna id flora. The non-native plants and animals usually possess greater netic adaptability and high reproductive rates; thus they are better able to just to man's environmental modifications. Ecological management of id can also eliminate many pests. For example, if certain food and fibre nts are most in demand, it usually becomes necessary to increase their ld by getting rid of all competition from other plants and eliminating as ich damage as possible birds, insects and wild animals. Weeding is a nmon method for getting rid of competition between the non-productive l the useful plants, while adding fertilizer to the soil increases the yield. sticides (insecticides and herbicides) are useful modern land nagement, although they create ecological problems. If, however, the cts of pesticides spread far beyond the immediate targets, great nage may be done to other organisms. It is essential that proper logical management of an area should eventually lead to the ninance of those organisms whose establishment is most desirable in a ticular area. (NEST, 1991)

Probably the most extreme case of the effect of man in modifying systems is the creation of cities. Such modifications have been caused by new structures (including the mass of buildings and pavements, which generally consist of steel, concrete, stone, wood, brick, and glass), and by industrialization, through various heating and cooling methods and ways of disposing of water and refuse. Natural ecosystems within the city are replaced by synthetic or artificial ecosystems. Such artificial ecosystems have advantages and disadvantages for man, plants and animals. Modifications to natural ecosystems outside the cities have not proceeded as far as those within cities. Nevertheless, the consequences have been quite marked in many areas. Modifications to forest, pasture and aquatic ecosystems are related to the needs of man. The extent of the modifications of forests or pastures in many parts of Africa is dictated by the need of the inhabitants, being most advanced in the areas of relatively high population density, such as the Ibo-Ibibio areas of south-eastern Nigeria, the Mossi area of Upper Volta and the Burundi-Rwanda area of central Africa. But while in some cases extensive damage to the ecosystem and poverty have resulted from inefficient ecological management, in others the needs of the people have provoked some sort of scientific land management. For example, highly intensive agricultural systems, involving the use of household manures and other forms of fertilizer, are being practised around many traditional and modern cities in Africa, as around Kano and Zaria in northern Nigeria. Vegetation is a very sensitive indicator of conditions in the total environment. This is because the structure and rate of changes in vegetational composition provide a key to the nature of the whole environment, since the assemblage of individual plant species into a plant community is the result of the interaction of the environment and the available flora over a period of time.

Vegetation is a useful indicator of the ecosystem, because it appears to be the only physical testimony to past environmental conditions, or events such as forest fires, or past climatic cycles recorded 'fossil' plants and pollen grains. Secondly, vegetation reveals much about soil conditions: the presence of salts and available nutrients, the physical structure; the capacity for yields of crop or timber; and many others. For example, American desert ecologists know that the big grease wood (Sarcobatus vermiculatus) usually indicates the presence of soluble salts in the soil and brackish ground 0.3-10.0m below the surface. The bamboo plant is an indicator of the presence of underground water, while the occurrence of selenium indicates the presence of certain minerals in the substratum. Finally, because of the difference in palatability of various plant species to animals, vegetation is a very delicate indicator of the kinds and numbers of animals present and the grazing history of an area, while range ecologists can often tell at a glance whether a given area is overgrazed or can profitably carry more stock. Similarly, the African bush fallow farmer knows which plants indicate barren land and which ones indicate regenerated fallow.

The natural resources in the local government area is being depleted at an alarming rate. The virgin forest is being infiltrated by hunters, farmers and fire wood/timber exploiters. Most of the streams that use to be perennial have become seasonal due to the impact of human activities that have come to bear on the streams/rivers.

1.2 STUDY AREA.

1.2.1 Climate.

The mean annual rainfall for the study area range between 1100mm to 1200mm while the mean onset dates of the rains is after May 20th. The mean cessation dates of the rains range between 17th to 27th of October while the length of the rainy season range between 181 – 200 days.

1.2.2 Other Physiographic aspects

1.2.2.1 Vegetation.

The fringing forest belt found along the Banks of streams and rivers that occur in the local government area include Elaeis guineensis, Afzelia africana and Eutada africana.

The vegetation of the local government area can generally be described as a typical Guinea savanna with a mixture of trees, Shrubs, herbs and tall grasses. The Local Government has a relatively dense structure of vegetation which becomes denser further South where the tree species are taller and closer.

Water-loving grass such as pennisetum purpuneum grows along the sides of the water bodies. (Adefolalu et al 1988)

Some parts of the Local Government area comprises the transitional vegetation between Shrub grassland and woodland with a mixture of tree, Shrub and grasses. Prominent tree species include: Butyrospernum Paradoxum, Parkia Lappertoniana, Terminalia avicenniotdes while grass species include: Andropogon schiernsis Hyparrahenia Filipendula and Mono cymbiumcereli forme.

1.2.2.2 Geology.

Greater part of the Local Government Area is underlain by hard rocks of the crystalline basement complex which are believed to be pre-Cambrian in age. The other part is covered by sedimentary rocks of cretaceous to recent age.

The Local Government Area is dominated by cretaceous sediments with hills covered by laterite. The large flat areas of sedimentary rocks in the Local Government Area are covered by sands and clay. Variations occur in the textures and composition of the soils. The abundance of streams / rivers in the Local Government Area and the seasonal supply of fresh, alluvium make the area fertile and suitable for the traditional rice plantations and possibly other crops such as Maize and sugarcane.

1.2.2.3 Hydrology.

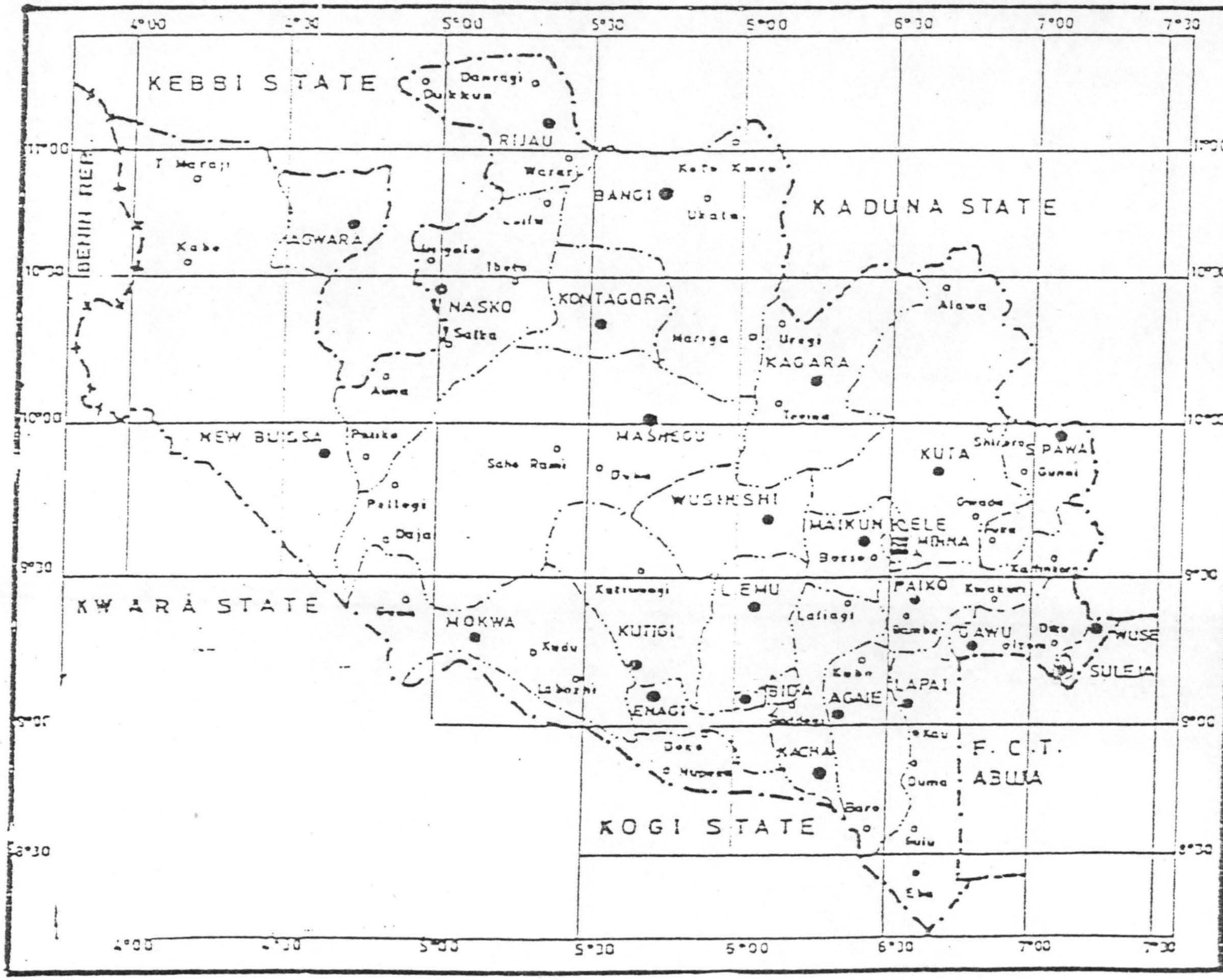
Hydrology embraces the study of the movement of water underneath and at the surface of the ground. The hydrological cycle in a region is highly influenced by the climatic conditions and the underlying geology: rainfall interception of rain water by vegetation, evaporation and evapotrans privation and infiltration.

There are many surface rivers in the Local Government Area of which many were perenial. Virtually all the rivers are now seasonal as a result of human activities that have come to bear on their regimes.

The volume of water in the rivers is controlled by the season and the climatic conditions in the different parts of the Local Government area particularly the length of the rainy season.

The major rivers in the Local Government area include Rivers Bwacha, Kawo Dangana, Danko, Kpandaragi, Jangada Nassarawa, Waragi, Etsugi, and Langizalakura. These are the rivers/streams that are of hydrological significance. The impacts of human activities on these streams/rivers will be discussed in chapter 3.

FIG 1 STUDY AREA



1.3 **Aim and Objectives.**

The aim of this research is to carry out rapid inventory study on the ecologically blighted areas in Lapai Local Government Area of Niger State. The main objectives include:-

a. Vegetal cover assessment of the research domain.

b. Assessment of the major Rivers/Streams.

c. Assessment of erosion within the Local Government Area.

d. Assessment of the Kpashimi Forest Reserve.

e. Assessment of the Batako Fadama Land.

f. The human activities Vis-à-vis (a-e) above.

2.0 VEGETAL COVER ASSESSMENT.

2.1 Background.

Drought and desertification possess many common characteristics although the latter is more complex in nature and connotes more lasting damage to the environment. Because they are intertwined, they tend to be confused, at least temporarily, with each other. The phenomena area, however, not identical.

Drought may be defined as a climate even involving a shortage of rainfall sufficient to affect adversely crop and animal production, causing much disruption of economic activities and producing some ecological changes in the affected areas. A drought is primarily a periodic natural event with a subtle beginning and insidious progress, but its consequences can be significantly altered by man. The degree of impact of a particular drought on the environment and the extent to which it may be a disaster for the human population depends on a complex of interwoven factors, such as the length of the period separating the drought from a previous one, the severity of rainfall deficit relative to a given mode of land use, the level of population pressure, and agricultural and water management practices. Except for a few cases of long term persistence, drought usually cures itself, sometimes tumultously, by giving way to an abundant rainfall for a season or two. Thus, drought usually administers temporary shock to the environment.

Desertification, as an environmental term, became very popular after the extreme episode of the Sahelian drought of the 1970s raised questions as to whether the desert was advancing into the marginal environment to the south, questions which were reminiscent of the "encroaching Sahara" controversy of the 1930s. It is a much more gradual phenomenon than drought operating on a time scale of several years or decades. It may not be readily apparent even to the Local people if human intervention in the environment has not been drastic. This is due to the spatial and temporal characteristics of rainfall in the arid and semi-arid regions which usually results in low and variable biological production. During the dry season, vegetative cover is minimal. Conversely, during the short wet season, the declining quality of the soil may be temporarily masked by lush vegetative growth. However, if deterioration of the land continues unabated such that even when the rainfall is copious the vegetation does not recuperate, then desertification has set in.

It is not simple to arrive at a satisfactory definition of the concept of desertification. As an all-encompassing concept, desertification has been broadly used to describe all types of land degradation in any kind of environment, including sub-humid and humid forest. However, while diminution of biological productivity can occur in any climatic environment, the term desertification is best reserved for arid and semi-arid areas. We can thus simplify the definition of desertification to the degradation of ecosystems in arid and semi-arid regions, where degradation means the loss of primary productivity.

2.2 Extent of desertification in Nigeria.

According to FAO, WMO, and UNESCO (1997) about 15% or (140,000km2) of Nigeria is prone to desertification. It includes arid and semi arid areas where the following manifestations of severe desertification are apparent, on an extensive scale.

(i) forbs and shrubs have largely replaced grasses or have spread to such an extent that they dominate the flora; or

(ii) Sheet, wind, and water erosion have largely denuded the land of vegetation and large gullies present; or

(iii) Salinity has reduced crop yields, may be by more than 50 percent, or

(iv) All of the above conditions are combined.

The areas of the country that are being besieged by severe desertification are inhabited by an estimated 28 million people and over 58 million livestock.

How fast is desertification advancing in Nigeria? This is an important question from the point of view of environmental management, but which is still difficult to answer for the country. This is because various governments, until recently, have not seen desertification as a problem requiring high priority attention. Consequently, there has been no real monitoring of the rate at which the arid and semi-arid areas of the country are being degraded. Estimates by scientists vary from less than 1km to about 15km per year. On the other hand, other scientists contend that it is not moving along a linear front but occurs in patches which expand in various directions and at rates which very considerably. As the degraded patches grow, they may link up to produce extensive wasteland as in the extreme northern part of Borno State where communities such as Bula Tura, Kaska, Bukarti, Toshu, Tubtulowa, and Yunusari, among others, have been either completely surrounded by sand dunes or are about to be buries by them.

Notwithstanding the absence of absolute figures on the rate of spread of desertification in Nigeria, an indisputable fact is that most of the region north of latitude 12°N is heavily prone to ecological degradation. For example, about 65 percent (67, 225km^2) of Sokoto State is said to be under siege, while about 64, 123km^2 or about 55 percent of Borno State is afflicted. In Gida Kaura, a village 90 km northwest of Sokoto, sand dunes have been reported to have invaded vast areas of farmland and swept a whole village of nearly 300 houses out of existence. In the extreme northern part of Borno State, a post-primary school established some years ago could not be put to proper use because moving sands make access to it difficult. Also people have been moving southwards to areas around Gashua, Nguru, kukuwa, and Monguno, which themselves are within the fragile environment. Thus, it may be said that hundreds of thousands of square kilometres of arable land have been lost to desertification.

2.3 Desertification in Lapai L.G.A.

Desertification is basically a physical process by which, first, the plant cover, species diversity and primary productivity of arid or semi-arid ecosystems are drastically reduced. Reduction in the vegetation cover increasingly exposes bare soil to large microclimatic changes which alter the soil surface, making it more vulnerable to wind and water erosion. Because the perennial plant species are reduced in density, deflation is no longer compensated for by sand deposition and wind erosion may accelerate, removing all movable fine and loose particles and leaving the land surface covered by pebbles or stones. At this stage, permanent plant life may become impossible because lack of water reserves in the remaining shallow soil may prevent seedlings from surviving the first prolonged drought period. In shifting sands that accompany deflation, perennial species cannot get established because as soon as the seedlings emerge, they are uprooted and blown away or overwhelmed. Degraded vegetation cover also increasingly exposes the bare surface to the impact of torrential rains that are usually characteristic of the short wet season of the arid and semi-arid areas. Large rain-drops associated with these rains disperse the finer particles of soil and wash them into the soil pores. This effectively seals up the soil surface which, in turn, reduces the infiltration of rain water and increases the rate of surface runoff. The cumulative effect of these mechanisms resulting from vegetation reduction is the production of a land surface where the regeneration of plants is difficult and where there is a general decrease in the productivity of the ecosystem. Eventually the environment becomes unusable to the local inhabitants.

Desertification, in its most widespread form, is generally represented as a function of the interaction between people and the environment. It is result of three major factors:

(a) Inherent extreme variability of climate as manifested in droughts;
(b) Disruption in the ecological system caused by a long period of improper land use by man and the ever-in-creasing demand being made upon the available land resources by socio-economic systems of the affected areas; and
(c) Failure by people to develop appropriate conservation measures.

In areas of the Local Government where there is serious vegetal cover depletion, it is either the vast majority of the people are subsistence farmers, nomadic pastoralists whose activities include cultivation of land, overgrazing, fuelwood prospecting and timbering activities.

The Lapai-saminaka axis is seriously under vegetal cover depletion. Also Lapai – Nassarawa and Lapai-Kpashimi. These are areas that are ecologically blighted and under serious threat as a result of overgrazing, cultivation and deforestation.

2.3.1 Overgrazing.

The livestock carrying capacity of the pasture land has been exceeded so that overgrazing becomes prominent.

The Lapai – Saminaka and Lapai – Nassarawa axes is ecologically threatened in this regard. Hundreds of Fulani Normadic pastoralists are now permanently settled in locations such as Saminaka, Dangana Tsohon Lapai and Mawogi.

Overgrazing is commonly attributed to:

(a) Selective grazing, in which preferred species are eliminated and replaced by less palatable ones;

(b) ***Premature grazing***, in which plants get eaten before they reach the seed production stage; and

(c) ***Trampling***.

Overgrazing tends to become more common and destructive during drought when large areas that would normally have been available for grazing dry up. Inevitably the pastoralists concentrate on the limited amount of range land to be found. The land is often grazed beyond recovery at such times. At times the problems is that the pastures do not have enough time to recover between droughts. Overgrazing then results, as the animals graze the remaining grasses even closer and browse shrubs and trees ruthlessly and destructively. The cutting down of the foliage of isolated trees for animal feeding, a normal practice in some areas, was particularly intense during the 1969-1973 drought as this was the only source of food for livestock in some places.

2.3.2 **Cultivation.**

The influx of migrant subsistence farmers into the Local Government Area has aggravated the already bad situation in terms of vegetal cover depletion. In virtually all the settlements along Lapai–Saminaka and Lapai-Nassarawa – Kpashimi axes there exist new migrant settlements comprising mostly Gwari's and Hausas from neighbouring Local Government Areas. The other migrant farmers include TIVS, mada and, Bassa. These migrant farmers have settled in virtually all the settlements in the Lapai – Saminaka and Lapai – Nassarawa – Kpashimi axes. The Gwaris are in their thousands and they came from Paikoro, Minna and Shiroro Local Government Areas where the soil fertility has deterioted and they are now in search of fertile land to cultivate their crops. Some other migrant farmers are all the way from Nassarawa State where the recent civil unrest led to the movement of people out of the crisis zone to settle in the Local Government Area.

The combined action of these diverse migrant farmers has led to the clearing of virgin land and even encroachment into the protected Kpashimi forest reserve to hunt for games.

In all the settlements where vegetal cover survey was carried out especially along Lapai – Saminaka and Lapai – Nassarawa – Kpashimi axes there exist migrants farmers who are actively engaged in farming activity.

2.3.3. **Deforestation.**

Deforestation, resulting from uncontrolled cutting of wood for firewood and charcoal, for construction, and for other domestic and industrial uses, is now a serious problem in the L.G.A.'s ecosystem. Estimates put the total annual consumption of wood in the L.G.A. at about 500 to 550 cubic metres of which about 90 percent is firewood. Annual deficit of fuelwood in the area is about 50 to 80 cubic metres. Annual deforestation of the woodlands in the L.G.A. runs to about 2 hectares a year. The fuelwood extraction rate in the L.G.A. is estimated to be about 3.85 times the rate of regrowth and almost ten times the rate of regeneration. These speculative figures give a rough idea of the magnitude of the problem and the degree of severe population pressure on woody species in many parts of the area. As population increases, wood will become scarcer. Once nearby wood resources have been exhausted, firewood dealers must travel further, and scarcities spread in an expanding ring around Lapai. Pressure on wood resources becomes more severe during a drought because it can, paradoxically, increase supplies of fuelwood. As fuelwood becomes more scarce during drought, prices may become so high that it is very profitable for entrepreneurs to bring in trucks and transport fuelwood to the cities from far distances. In addition, farmers need to make money for food during a severe drought and may be tempted to do this by selling wood cut off their farm trees. It is therefore very common to observed people carrying firewood or sacks of charcoal and trucks carrying firewood into town from peripheral rural areas even at the peak of a severe drought. It is indeed a paradox that deforestation continues at times of drought when the ecosystems can stand little disturbance. Government's efforts to reduce firewood consumption have not been successful because of frequent shortages of cooking gas and kerosine that could be used as energy-sources alternatives. In any case these fossil-fuels, besides their supply irregularities, are now definitely priced out of the reach of most people and are therefore no longer available as alternatives to fuelwood.

In general, land use in our arid and semi-arid areas appears to have entered upon a vicious cycle of misuse. Soil and vegetation resources are over-exploited resulting in the depletion of soil fertility and tree cover. Loss of soil fertility means that more land has to be used to make up for falling yields and gets overexploited in turn because of increasing human and cattle populations. The land gets progressively worse until desertification sets in. Compounding the consequences of man's bad management of his land resources is periodic drought which, now and again, interfers negatively in the cycle of attempts to extract more and more from a deteriorating environment. The consequence is a looming disaster for man and his environment.

2.3.3 **Bush Burning**.

Bush burning is a notorious agent of deforestation in the L.G.A. The burning results mainly from farmers who use it for land clearing, herdsmen who use it to regenerate grass, hunter to kill wildlife and some villagers to clear their sorroundings. Under control, fire serves the above purposes. But in most cases, the fire goes out of control to consume adjacent non-target vegetation. Ultimately, destructive bush burning derives from careless disregard for the value of vegetation because of lack of awareness or the attitude that vegetation is simply "bush" and a symbol of lack of development.

Bush burning is widespread along Lapai – Kpashimi axis where farmers, pastoralist and hunters engage in this type of illegal act. The socio-economic and environmental implications of these vegetal cover depletion is disturbing.

A cute shortage of both fuelwood and timber is already rearing its head as prospectors move further into the land to obtain them. The action is robbing us of tress and shrubs that are of high medicinal value. There is serious loss in biodiversity. Loss in vegetal cover is synonymous with the destruction of wildlife habitats and reduced animal populations as is the case with the Kpashimi forest reserve. There were lots of species of wild life including lions, Pythons, buffalos, roan deers, and hyenas between the 1960s and 70s. They have all disappeared except for a few of them in isolated locations within the reserve.

Deforestation automatically means the loss of the protection which the plant cover gives to the soil, as outlined at the beginning. This is what is largely responsible for accelerated erosion and the development of extensive gullies in various parts of the L.G.A. with the Lapai-Dangan a and Lapai Saminaka being the most hard-hit areas.

Accelerated runoff resulting from deforestation also gives rise to flash floods, very often with disastrous consequences to life and property.

In the L.G.A reduced infiltration rates associated with deforestation adversely affect ground water recharge and storage. This, very often, turns some formerly perennial rivers into seasonal or ephemeral streams.

2.3.4 **Vegetal cover survey within the research domain.**

Each settlement is taken as a sampling print, viewing its surrounding environment as a complete circle, it is divided into four sectors of 90° each following the basic principles of the four cardinal points.

Each sector is assumed to be composed of five types of vegetal cover namely:-

- Trees
- Shrub
- Grass
- Farmland
- Bareground

Estimate of each type as a fractional percentage of a possible 100% total is then recorded. For the settlement or sampling point, the average of each vegetal type over the four sectors constitutes the percentage cover by that type. If more than one observation is made at a settlement, these are again averaged for better estimates with higher degree of freedom.

2.3.6 RESULT.

The result of each settlement was tabulated by estimating the values according to the sampling technique described above. The mean for each vegetal cover in the four sectors were obtained to give the summary for each of the five types of vegetal cover for each settlement/location.

Table 1 Mean vegetal cover for the settlements/location covered.

Table 1.

S/NO.	TYPE OF VEGETAL COVER					
	Name of settlement	Trees	Shrub	Grass	Farmland	Bareground
1	KM5 from Lapai	50	30	10	5	5
2	Old Lapai	25	20	20	20	15
3	Mawogi	30	15	30	20	5
4	Saminaka	40	20	20	15	5
5	Daugana	25	20	20	30	5
6	Gidan Isah	15	20	15	40	10
7	Kawo	25	20	20	30	5
8	Baban Gwari	15	10	15	50	10
9	Bassa	40	20	5	30	5
10	Waragi	30	25	5	35	5
11	Sabon Orehi	20	15	10	45	10
12	Katakiki	15	10	20	40	15
13	Nassarawa	30	20	5	40	5
14	Kpashimi	65	20	15	0	0
15	Bwacha	30	20	20	20	10
16	Takuti Shaba	40	20	5	30	5
17	Takuti Abuja	40	15	10	30	5
18	Achitukpa	25	20	10	40	5
19	Zolegi	20	20	10	45	5
20	Zwafu	20	40	5	30	5
21	Shaku	25	20	15	30	10
22	Mayaki	60	20	10	10	0
23	Kunko	50	30	5	10	5

24	Lafiyan Kpada	65	20	10	3	2
25	Bassa Koto	50	15	10	20	5
26	Cece	55	25	5	10	5
27	Gada Biyu	20	15	10	50	5
28	Etugi	20	40	5	30	5
29	Gabi	25	30	5	35	5
30	Ndeji	20	30	5	40	5
31	Gbacido	30	30	5	30	5
32	Ndawashi	25	35	5	30	5
33	Mikugi Adako	20	30	5	40	5
34	Mikugi Tsagi	30	25	5	35	5
35	Dudugi	30	20	5	40	5
36	Gbarugi	30	25	5	35	5
Total	Mean	32.08	22.50	10.56	28.97	5.88

Table 7 has indicated the mean vegetal cover of the research domain.

For the percentage trees, the highest value is 65% obtained at Kpashimi and Lafiyan kpada. Other higher values range from 50% and above and they include KM5, Kunko, mayaki, Lafiyan Kpada, Basso Koto and cece. These are locations found around Kpashimi forest reserve. The lowest value is 15% and is to be found in locations where there is serious farming activity due to the influx of migrant farmers into the settlements.

High value of shrub (30-40%) occur in KM5, Kunko, Etugi, Gabi, Ndeji, Gbacido, Ndawashi and Mikugi Adako, the lowest value of 10% occur at Baban Gwari and Katakiti.

FIG.2 VEGETAL COVER ASSESSMENT FOR KM 5 FROM LAPAI

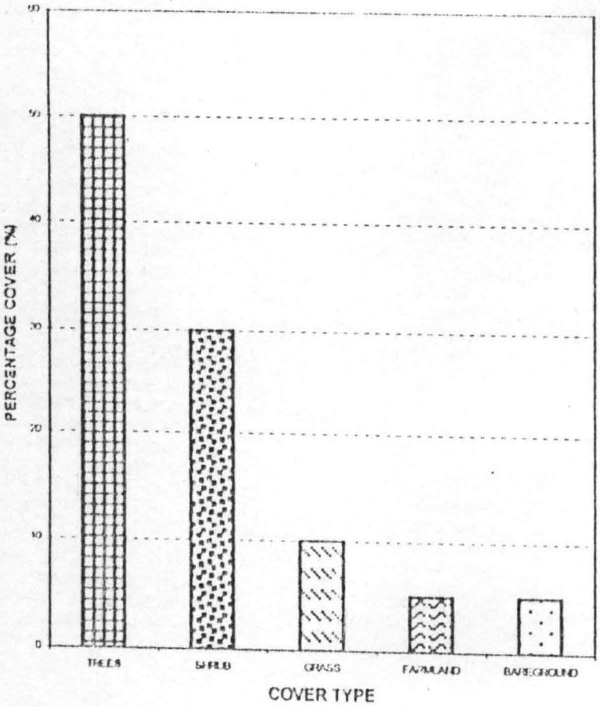


FIG.3 VEGETAL COVER ASSESSMENT FOR OLD LAPAI

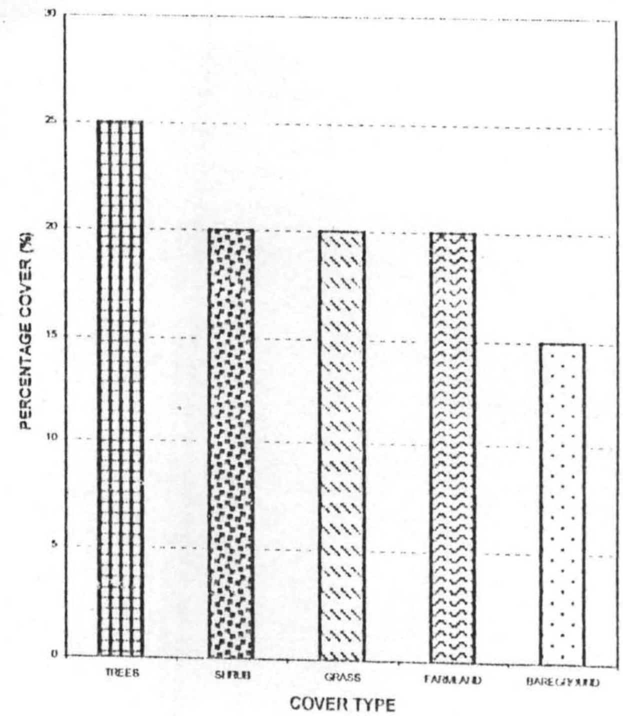


FIG.4 VEGETAL COVER ASSESSMENT FOR MAWOGI

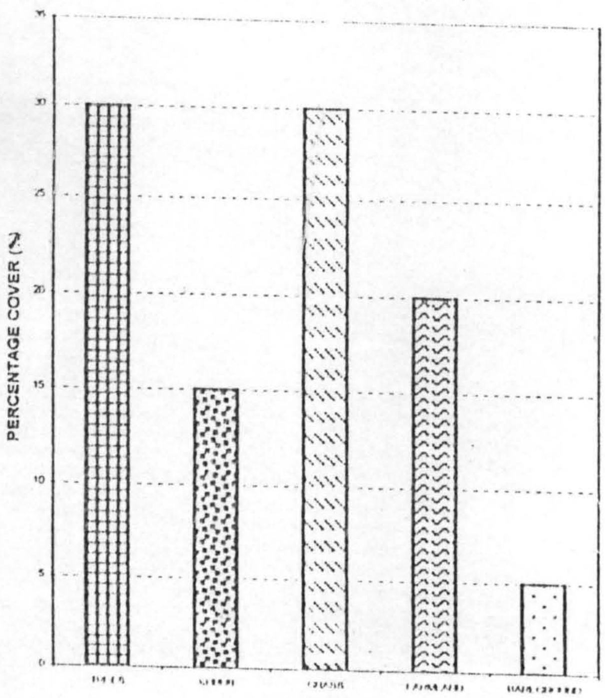


FIG.5 VEGETAL COVER ASSESSMENT FOR SAMINAKA

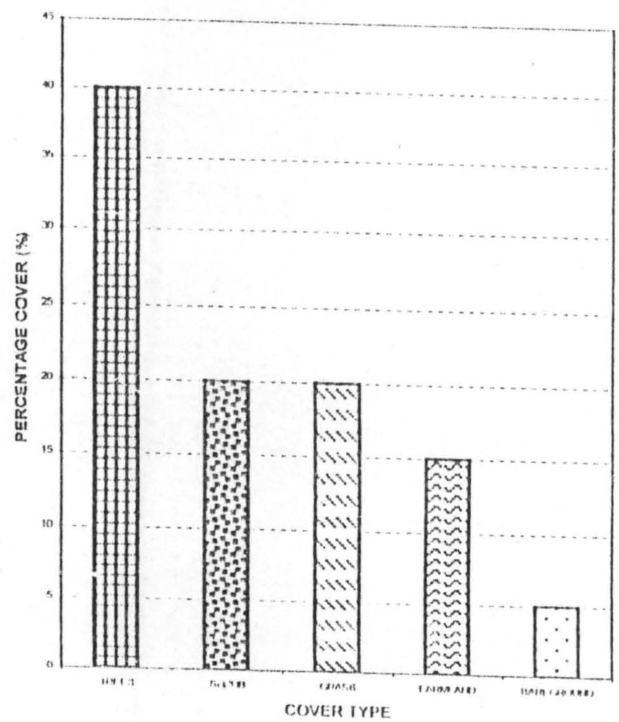


FIG.6 VEGETAL COVER ASSESSMENT FOR DANGANA

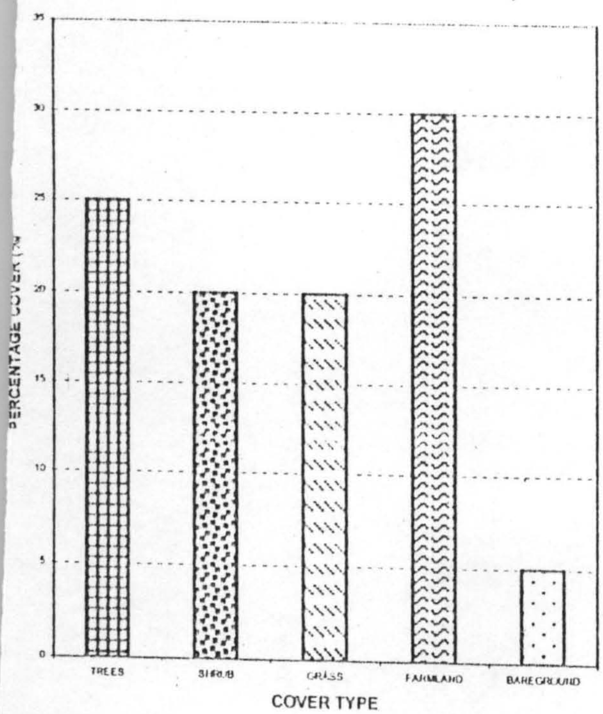


FIG.7 VEGETAL COVER ASSESSMENT FOR GIDAN ISAH

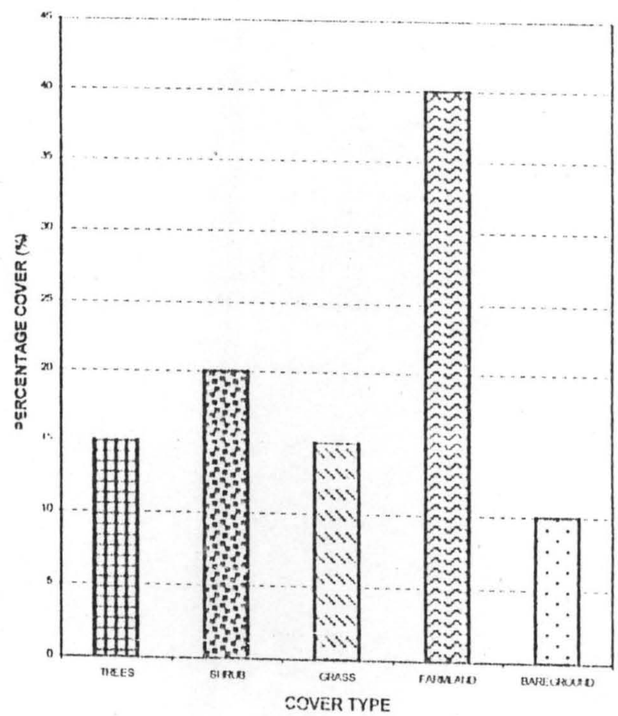


FIG.8 VEGETAL COVER ASSESSMENT FOR KAWO

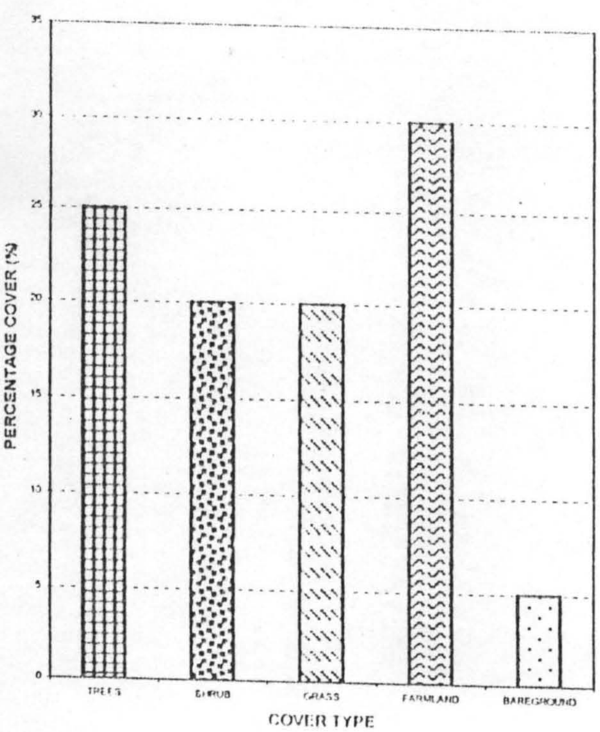


FIG.9 VEGETAL COVER ASSESSMENT FOR BABAN GWARI

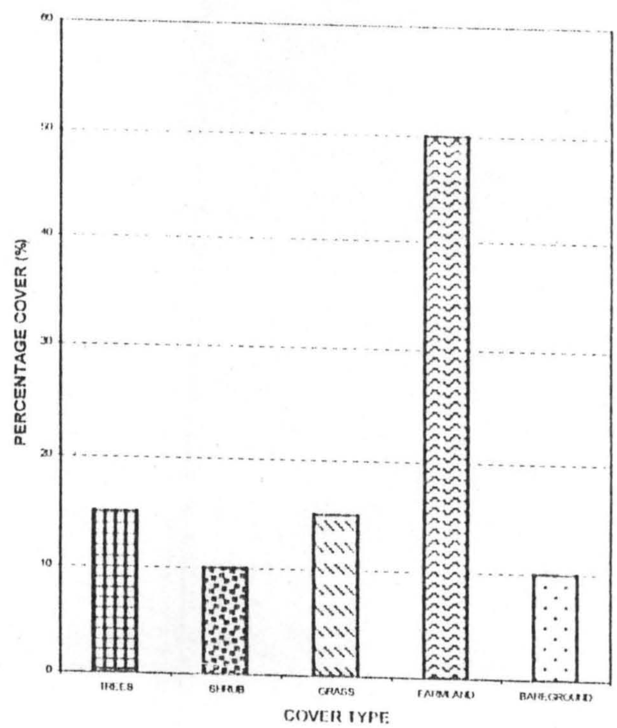


FIG.10 VEGETAL COVER ASSESSMENT FOR BASSA

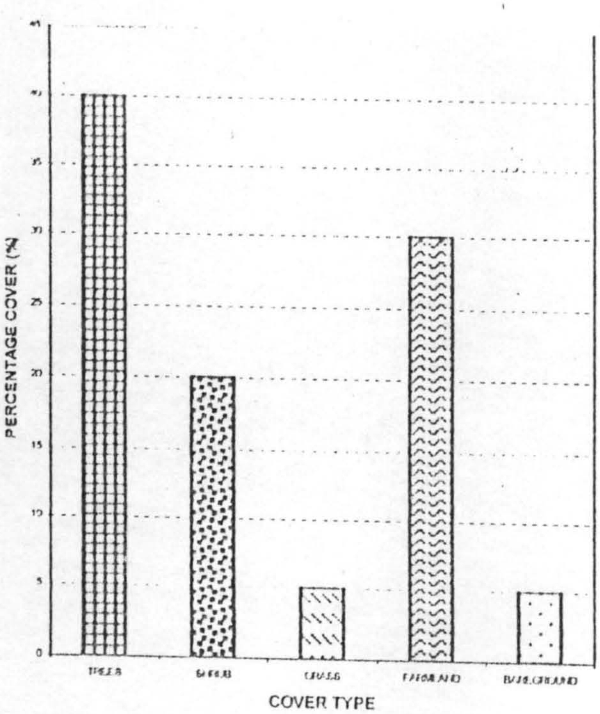


FIG.11 VEGETAL COVER ASSESSMENT FOR WARAGI

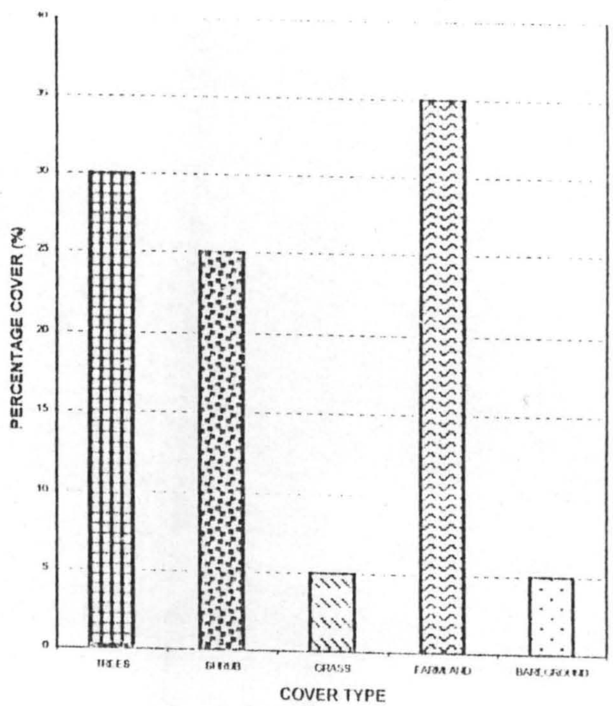


FIG.12 VEGETAL COVER ASSESSMENT FOR SABON OREHI

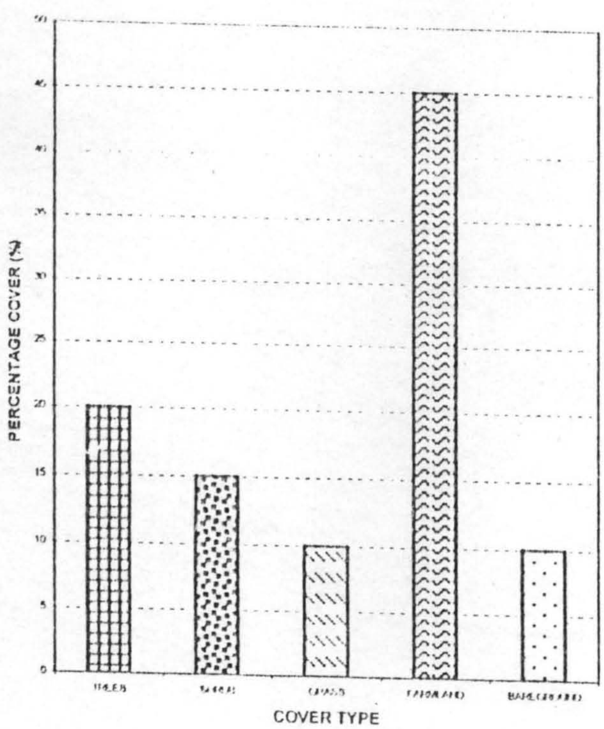
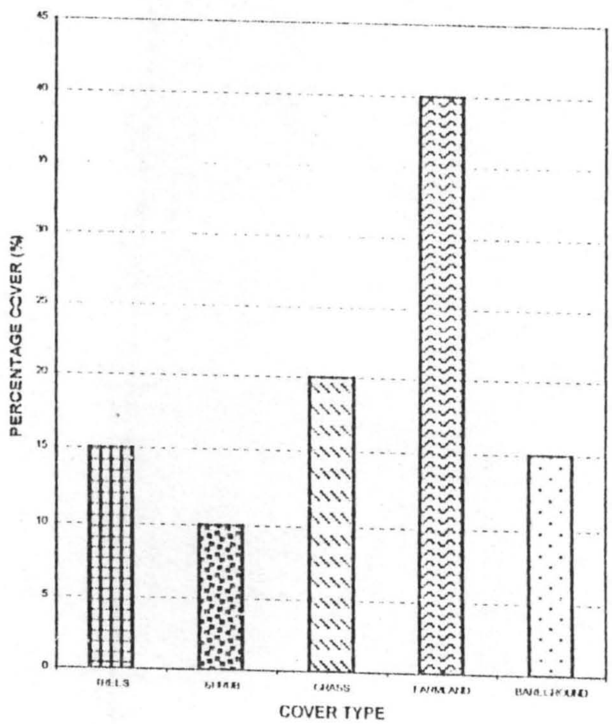


FIG.13 VEGETAL COVER ASSESSMENT FOR KATAKITI



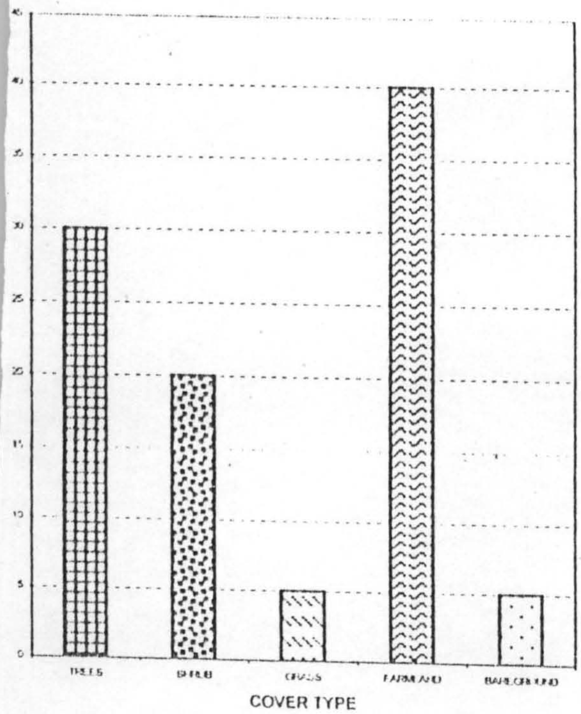


FIG.14 VEGETAL COVER ASSESSMENT FOR NASSARAWA

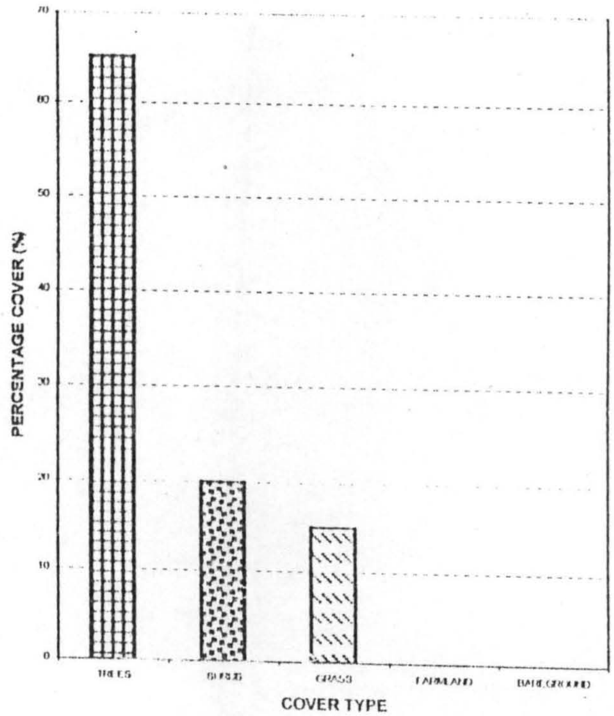


FIG.15 VEGETAL COVER ASSESSMENT FOR KPASHIMI

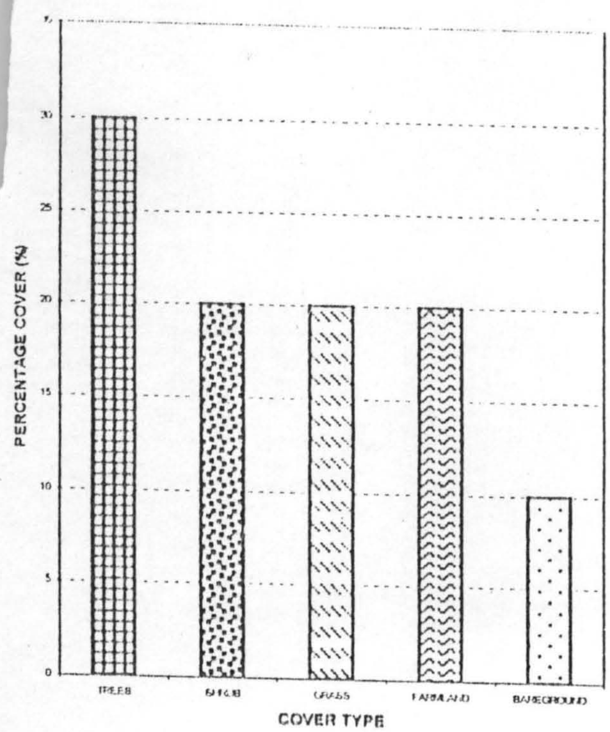


FIG.16 VEGETAL COVER ASSESSMENT FOR BWACHA

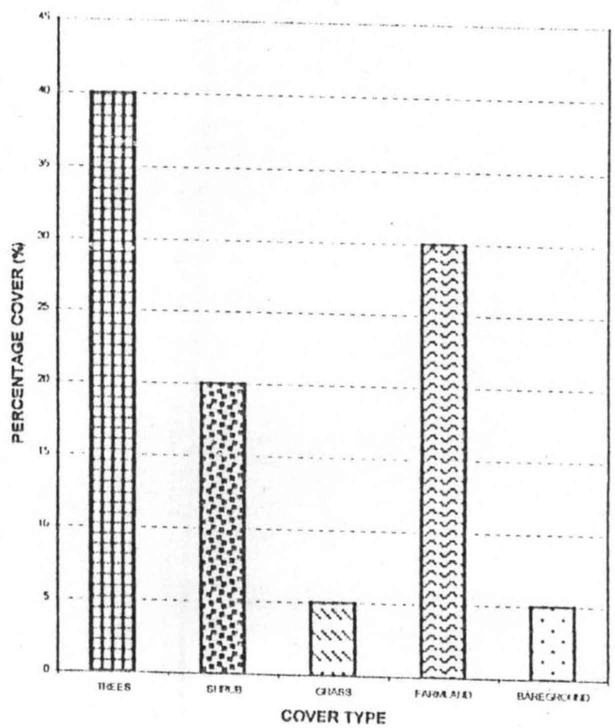


FIG.17 VEGETAL COVER ASSESSMENT FOR TAKUTI SHABA

FIG.18 VEGETAL COVER ASSESSMENT
FOR TAKUTI ABUJA

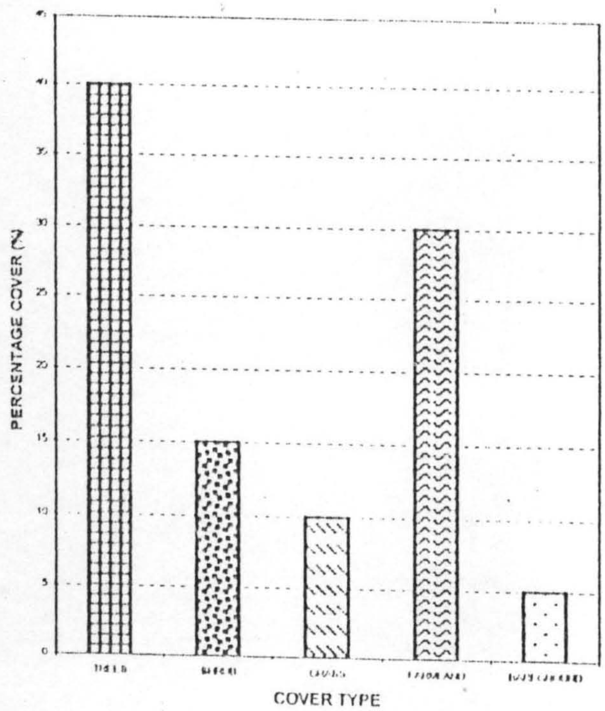


FIG.19 VEGETAL COVER ASSESSMENT
FOR ACHITUKPA

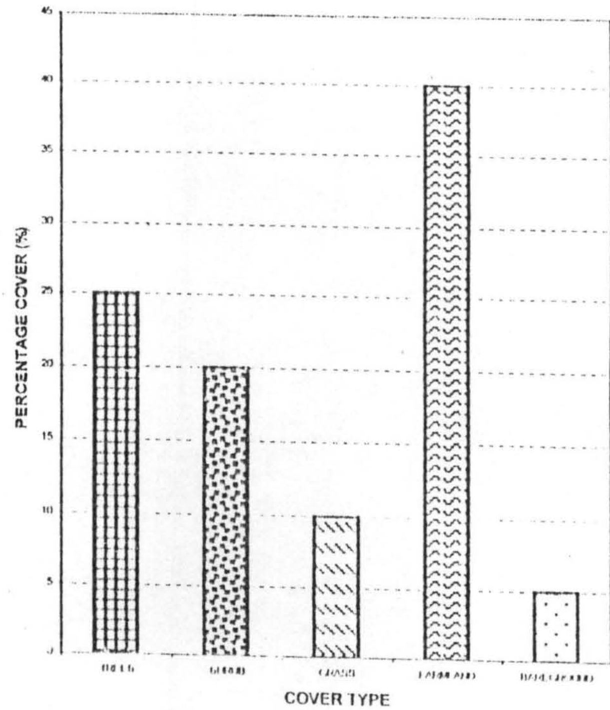


FIG.20 VEGETAL COVER ASSESSMENT
FOR ZOLEGI

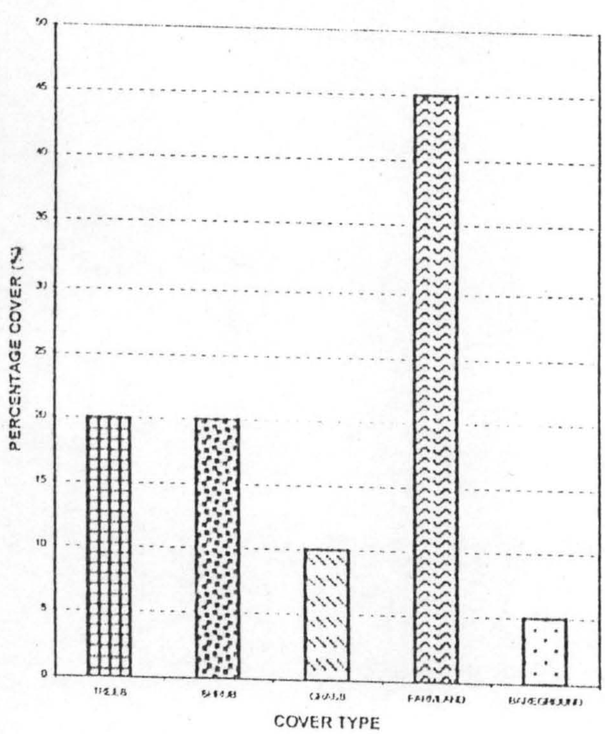


FIG.21 VEGETAL COVER ASSESSMENT
FOR ZWAFU

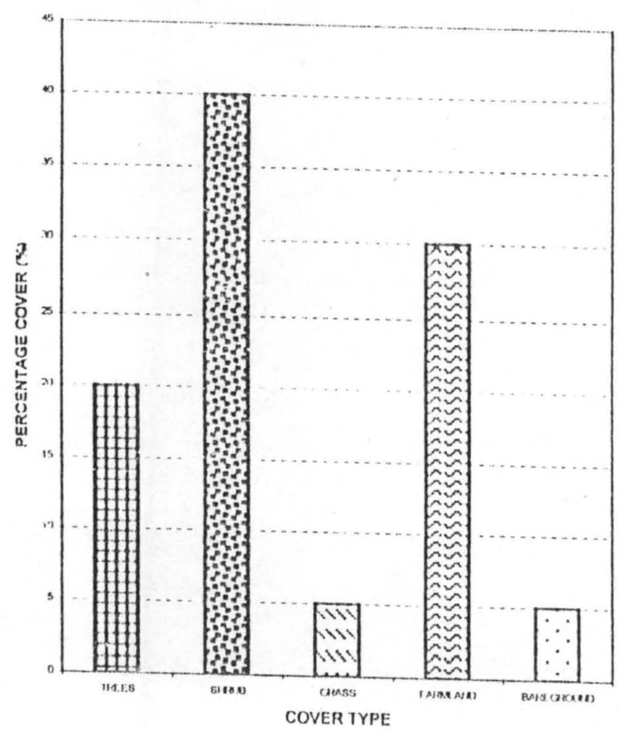


FIG.22 VEGETAL COVER ASSESSMENT FOR SHAKU

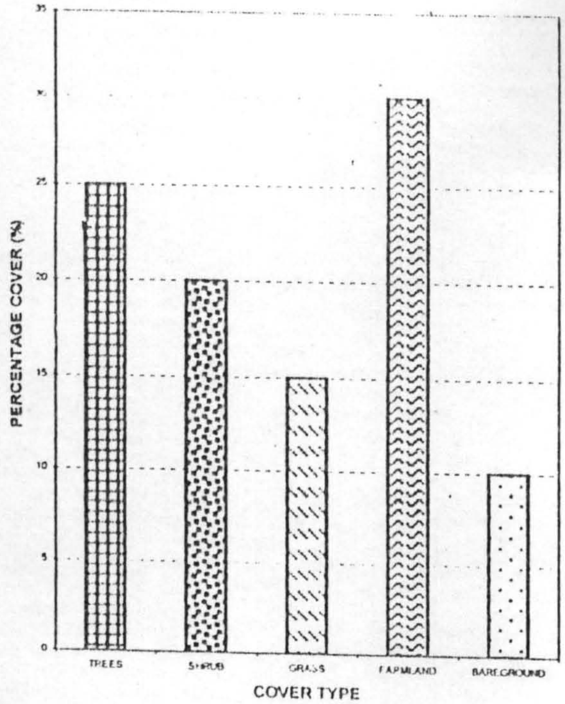


FIG.23 VEGETAL COVER ASSESSMENT FOR MAYAKI

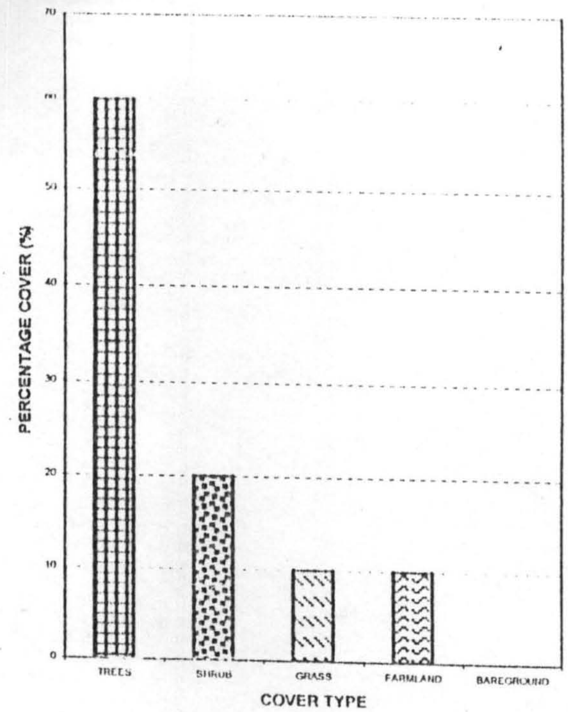


FIG.24 VEGETAL COVER ASSESSMENT FOR KUNKO

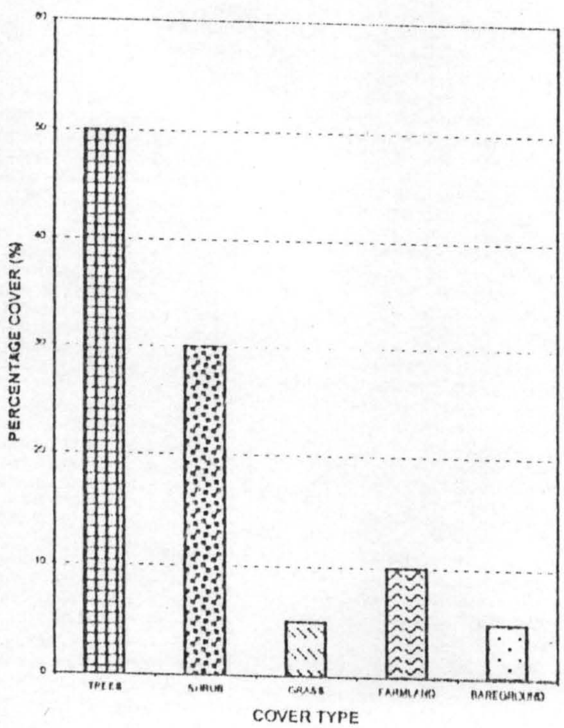


FIG.25 VEGETAL COVER ASSESSMENT FOR LAFIYAN KPADA

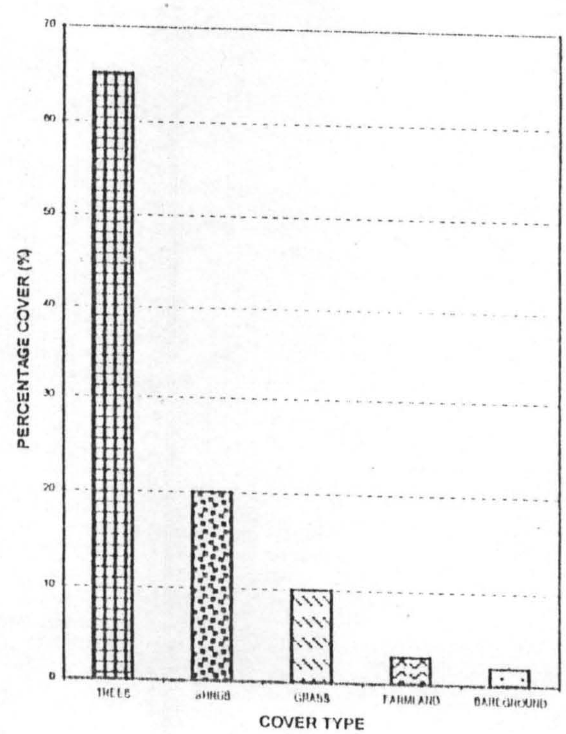


FIG.26 VEGETAL COVER ASSESSMENT FOR BASSA KOTO

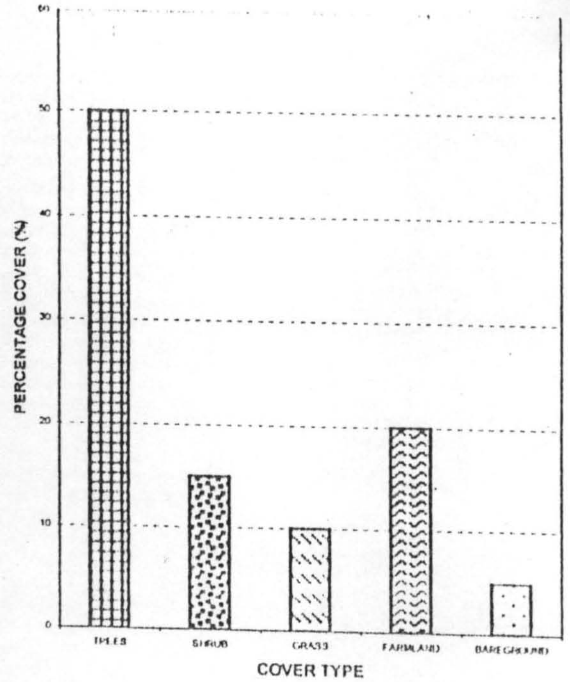


FIG.27 VEGETAL COVER ASSESSMENT FOR CECE

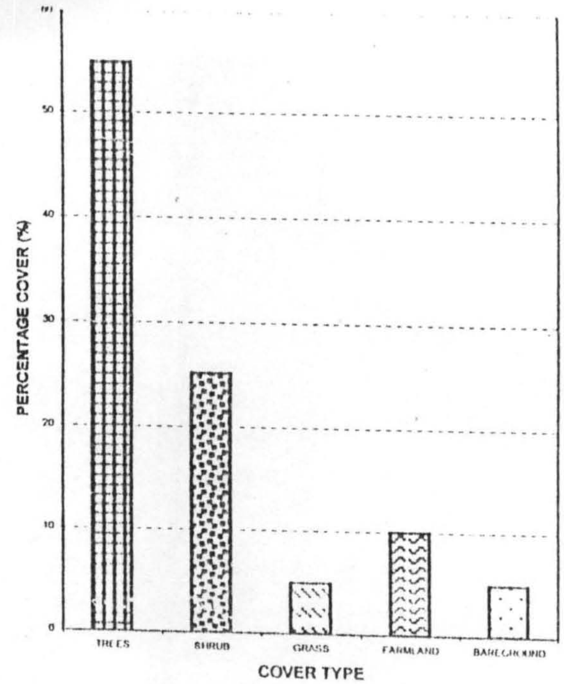


FIG.28 VEGETAL COVER ASSESSMENT FOR GADA BIYU

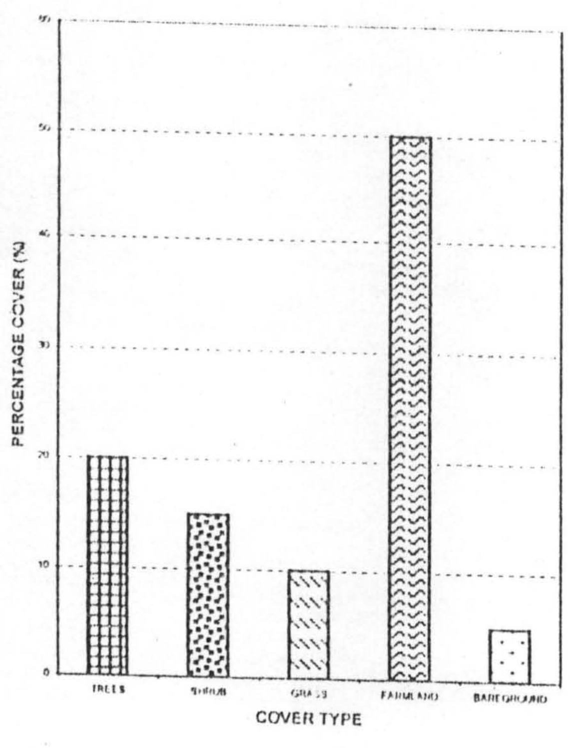


FIG.29 VEGETAL COVER ASSESSMENT FOR ETUGI

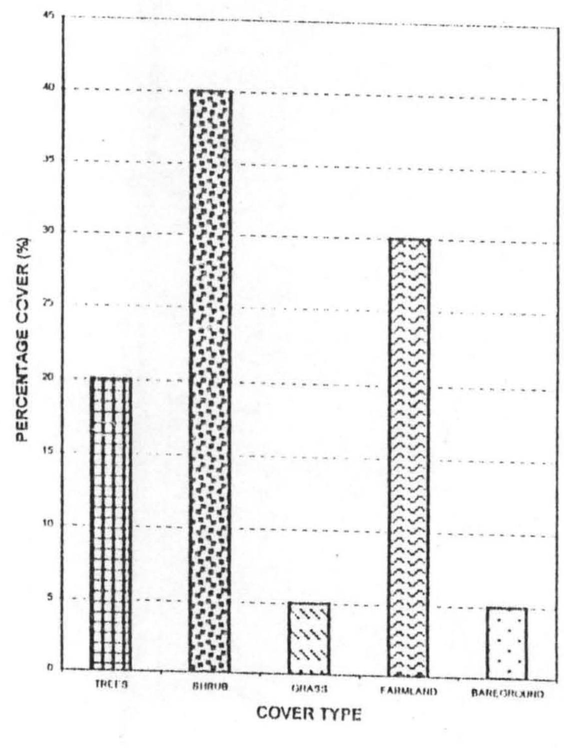


FIG.30 VEGETAL COVER ASSESSMENT FOR GABI

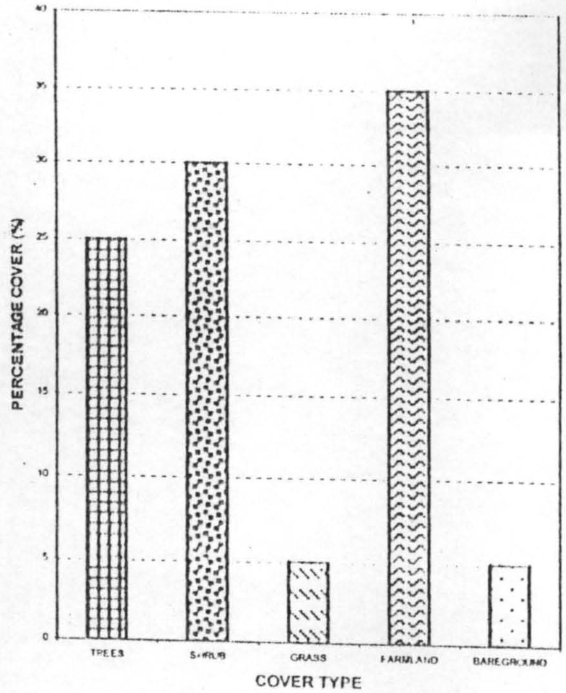


FIG.31 VEGETAL COVER ASSESSMENT FOR NDEJI

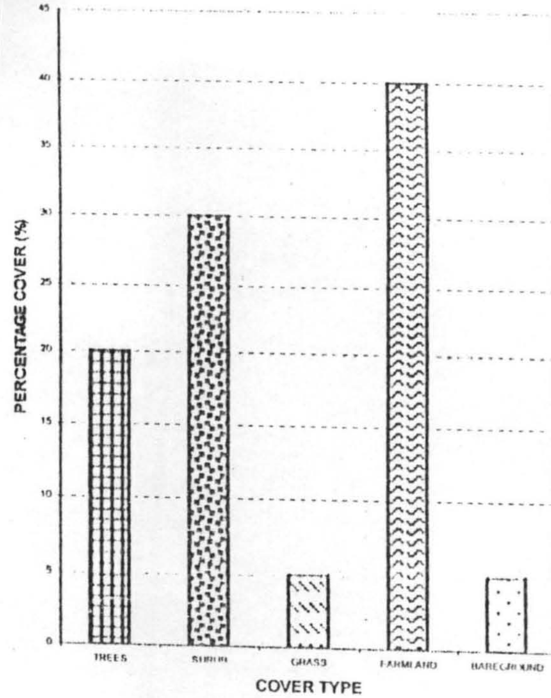


FIG.32 VEGETAL COVER ASSESSMENT FOR GBACIDO

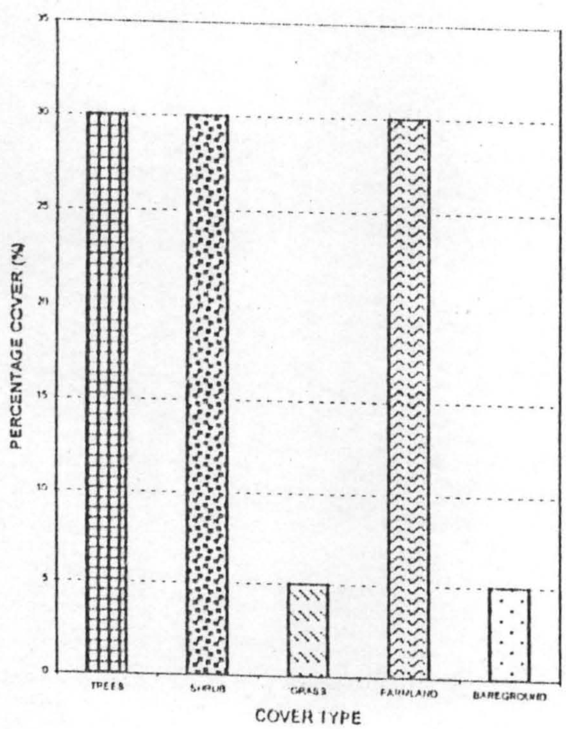


FIG.33 VEGETAL COVER ASSESSMENT FOR NDAWASHI

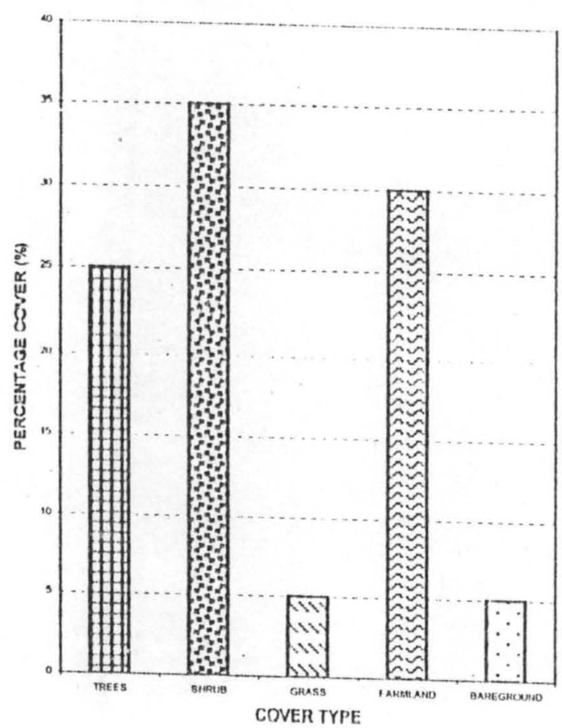


FIG.34 VEGETAL COVER ASSESSMENT
FOR MIKUGI ADAKO

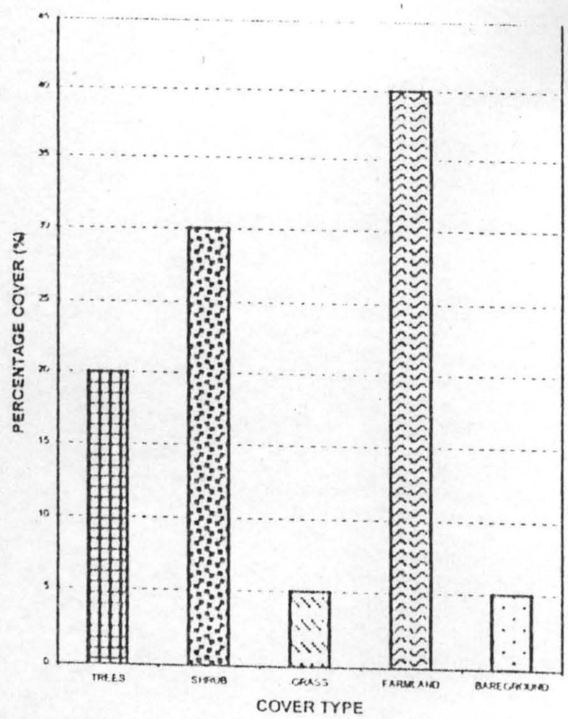


FIG.35 VEGETAL COVER ASSESSMENT
FOR MIKUGI TSAZA

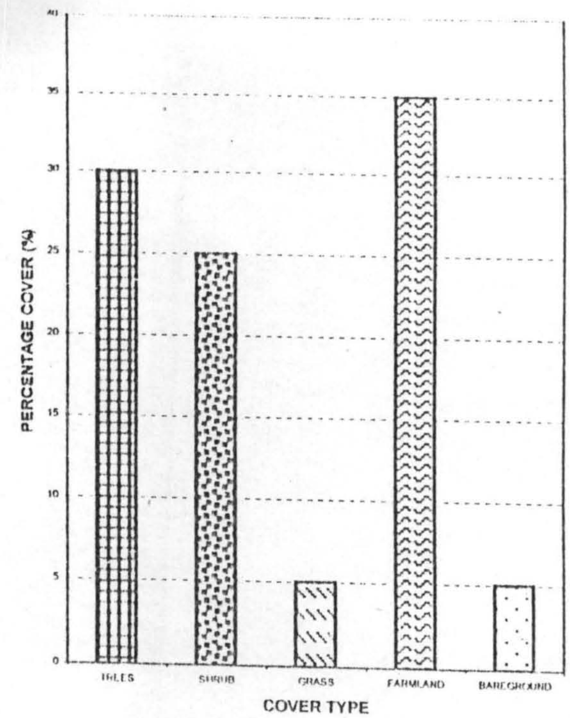


FIG.36 VEGETAL COVER ASSESSMENT
FOR DUDUGI

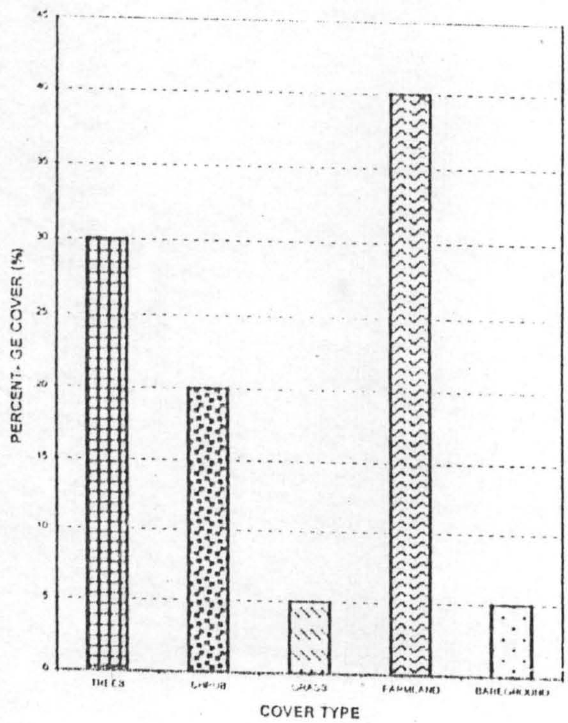


FIG.37 VEGETAL COVER ASSESSMENT
FOR GBANIGI

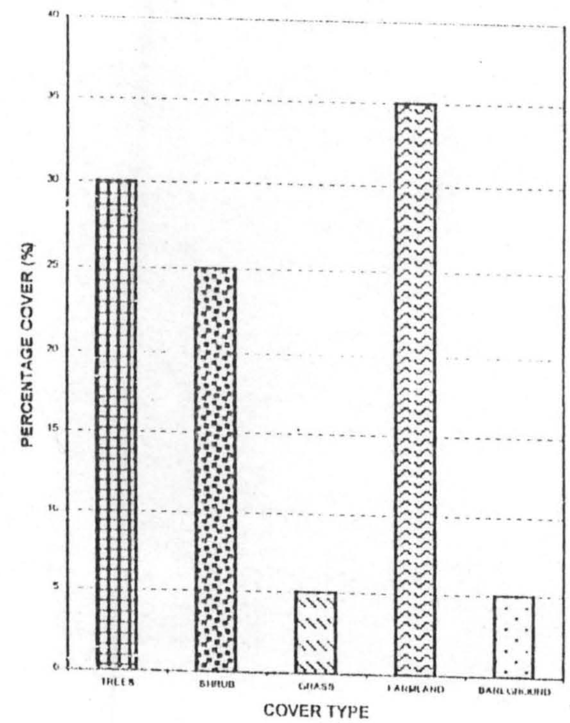
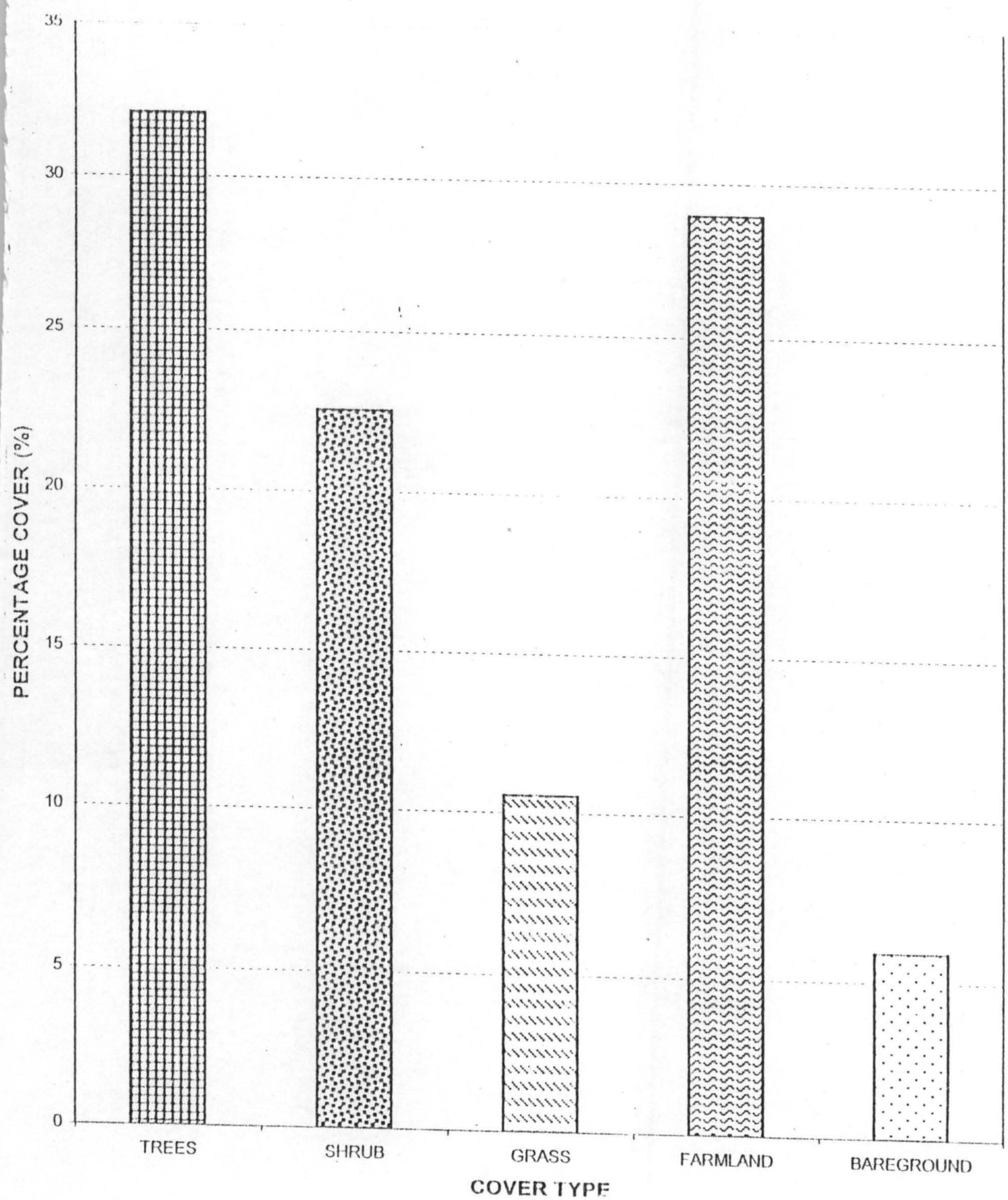


FIG.38 VEGETAL COVER ASSESSMENT FOR LAPAI LOCAL GOVT. AREA, NIGER STATE



Highest value of Grass occur at Mawogi with a value of 30%. The 15-25% value occur at old Lapai, saminaka, Dangana, Gidan Isa, Kawo, Baban Gwari, Katakiti, Kpashimi, Bwacha and Shaku.

High value of 40-50% farmland occur at Gidan Isah, Baban Gwari, sabon Orehi, Katakiti, Nassarawa, Achitukpa, Zolegi, Gada Biyu, Ndeji, Mikugi Adako and Gudugi while low value of 5 – 10% occur at KM5 Kpashimi. Mayaki, Kunko, Lapai Kpada and Cece.

High value of (10-5%) bareground occur at old Lapai, Gidan Isah Baban gwari, Sabon Orehi, Katakiti, Bwacha and Shaku. Lower values of 5% and below occur in the rest of the research domain.

The mean vegetal cover for the whole local government area indicate Trees 32% shrubs 22.5% Grass 10.5% Farmland 28.97 and Bareground 5.88.

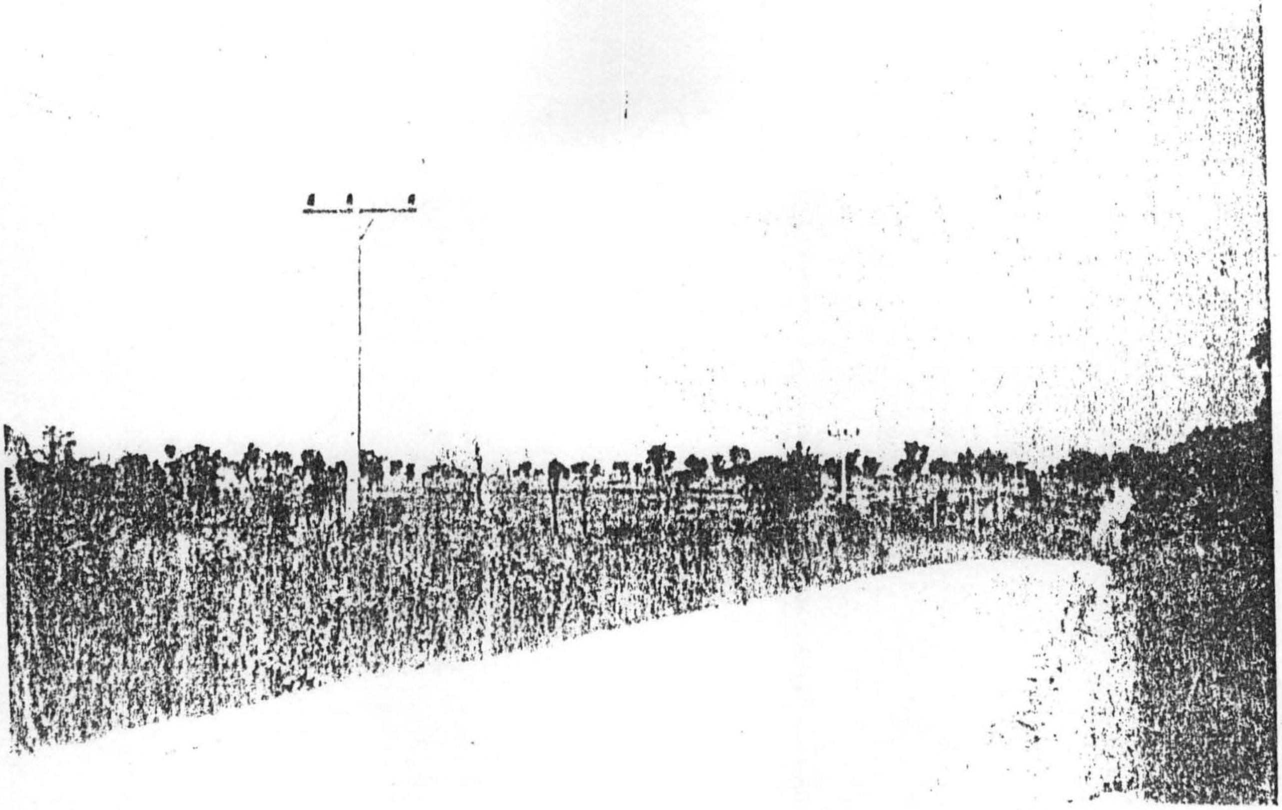


PLATE 1: New settlement at the foreground along Kpashimi Forest Reserve. Note the Reserve at the right flank

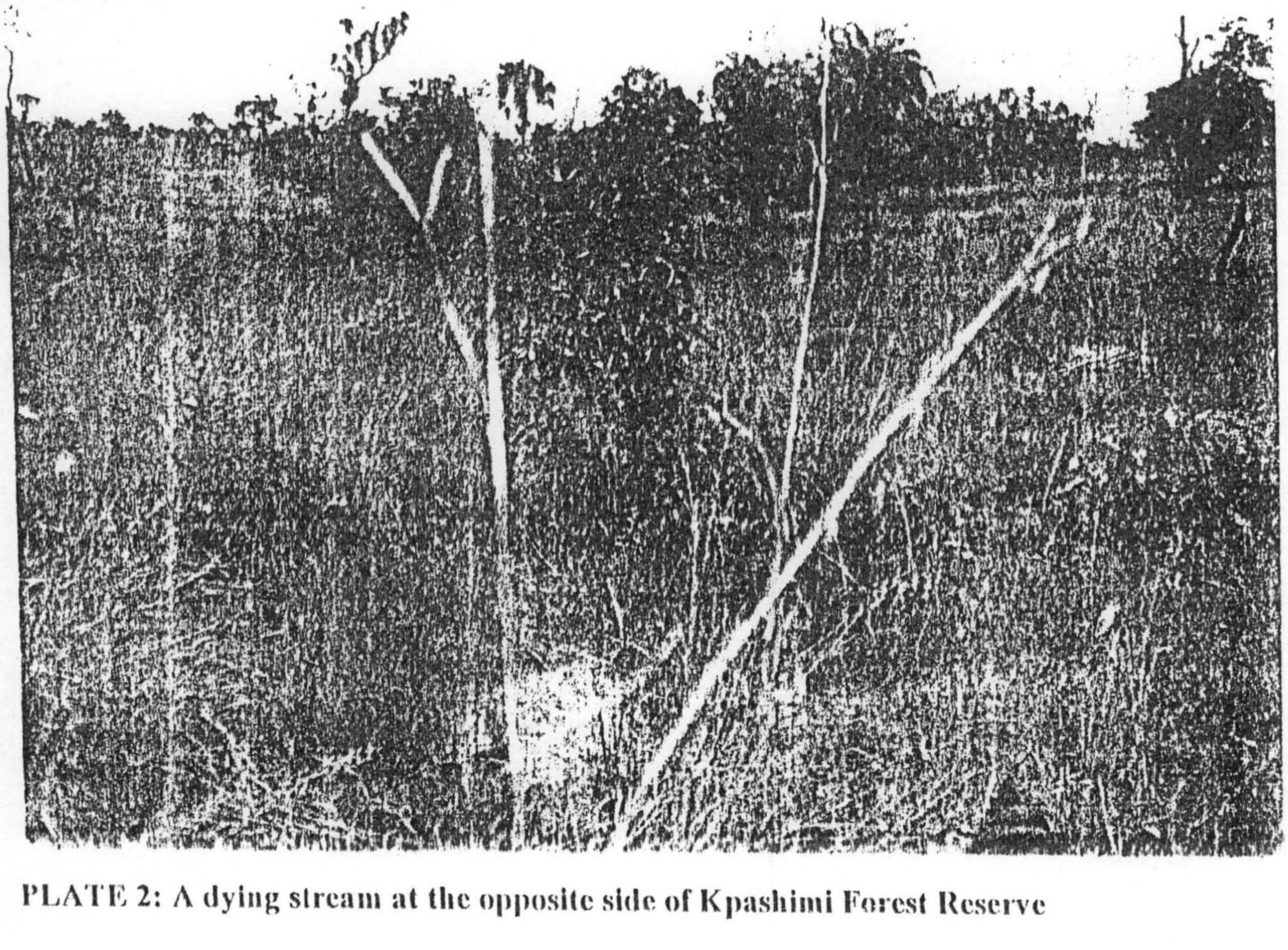


PLATE 2: A dying stream at the opposite side of Kpashimi Forest Reserve

PLATE 3: The Kpashimi Forest Reserve along Nassarawa road.

PLATE 4: Farming activity at the opposite side of Kpashimi Forest Reserve.

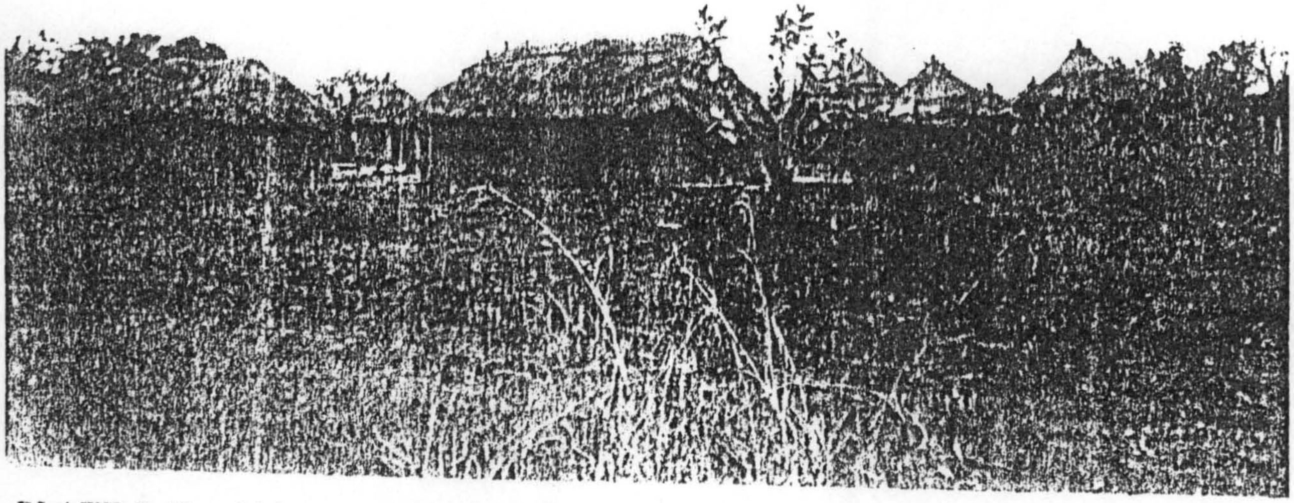


PLATE 5: Katakiti new migrant settlement

PLATE 6: New migrant settlement at Duma

3.0 MAJOR RIVERS/STREAMS.

Most of the streams/Rivers within the Local Government Area derive their source from the Arunze system. Virtually all the streams have become seasonal as a result of both physical and human impacts. The only Rivers/Streams that are still perennial and threatened include River Waragi, River Etsugi and River Langizalakura.

Rivers Kawo, Danko, Bwacha and Dangana were once perennial rivers but are now seasonal. The discharge is usually during the wet months with the peak between the month of July to August. By November/December; only "pockets" of ponds are seen along the channel. During the peak of the dry months the channel completely dry up. The major reasons for the drying up of these Rivers during the dry months could be attributed to physical and human impacts. The physical aspects refers to climatic conditions while the human aspects refers to depletion of vegetal cover, grazing and farming.

3.1 Physical aspects.

Precipitation in form of rainfall is the major source of overland flow. The water that infiltrates into the ground will later find its way to the surface through fissures and supply Streams / Rivers during the dry months. The drought of the early 60s, 70s and 80s has led to the drying up of some rivers/streams which were perennial before. This aspect is beyond the scope of this study.

3.2 HUMAN IMPACTS.

3.2.1 Vegetal cover removal.

The removal of vegetal cover from a forested area either for fuel wood, timber or bush burning lowers the infiltration capacity enough to generate large amounts of storm runoff where the previous runoff process was a slow subsurface percolation. This is the case in virtually all parts of the Local Government Area. Bush burning is more widespread between Duma and Kpashimi. The same goes for timber where illegal and licensed exploiters fell as much timber as they want. In some instances, the timber shades are located in the heart of the forest where the timber is processed and transported in lorries for marketing. One notable area of concern is at Bwacha. The cutting down of the forest tree has been found also to loosen the soil particles making easy for sheet erosion which could develop into gullies as experienced in Rivers Dangana Bwacha and Danko. The loose soils are transported into the main channel which "silts" it up. An increase in discharge during the rainy season then causes flooding and bank erosion. Incised gully erosion is widespread in Rivers, Dangana, Kawo, Bwacha and Danko. Along the Danko channel the bridge is almost threatened at the foundation. The silting up of the river render them inefficient during the dry periods because of Low flow/Zero discharge.

3.2.2 Overgrazing.

The problem of overgrazing is noticeable between Lapai – Saminaka and lapai – Duma axes. The Fulani nomads drive their cattle which browse at the grass no matter how low thereby exposing the area to flooding and erosion. It is expected that trampling of the soft alluvial soil along the channel will aggravate the problem of erosion. The herdsmen drive their

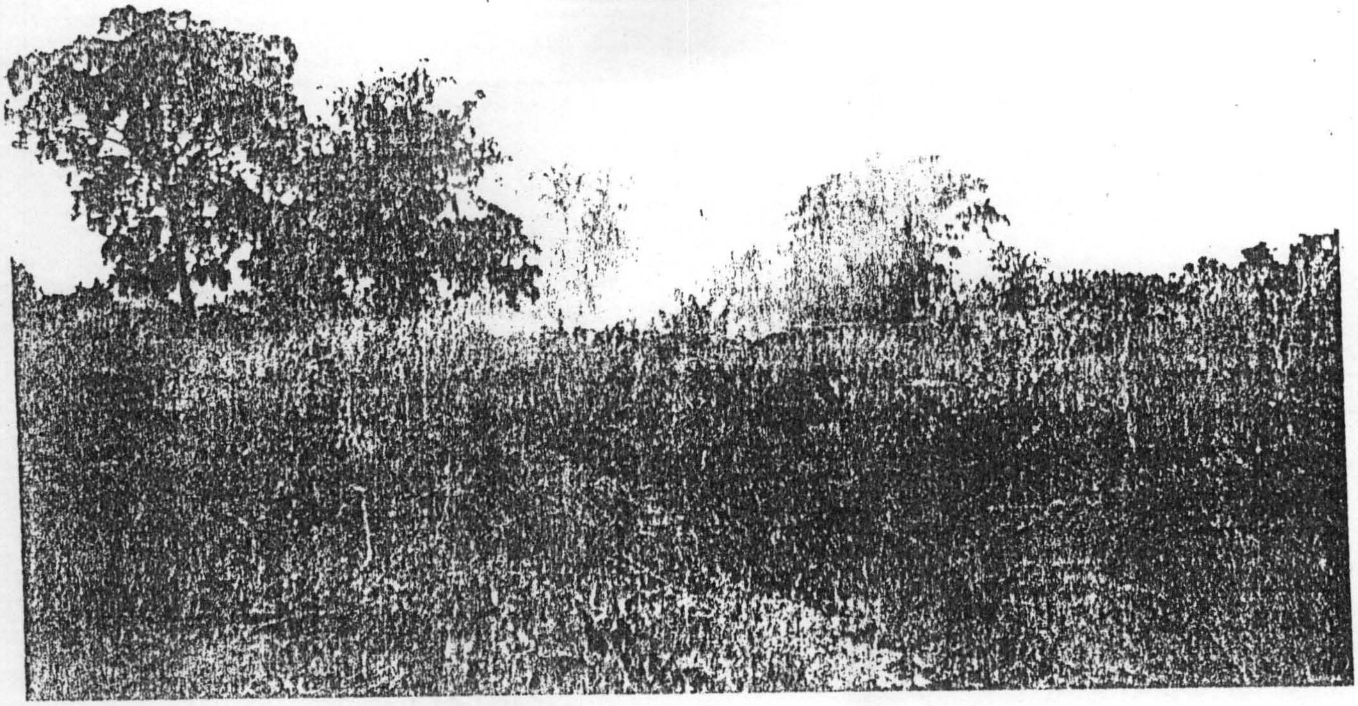


PLATE 7: Bush burning along Duma-Bwacha road

PLATE 8: The dying Kpandaragi river

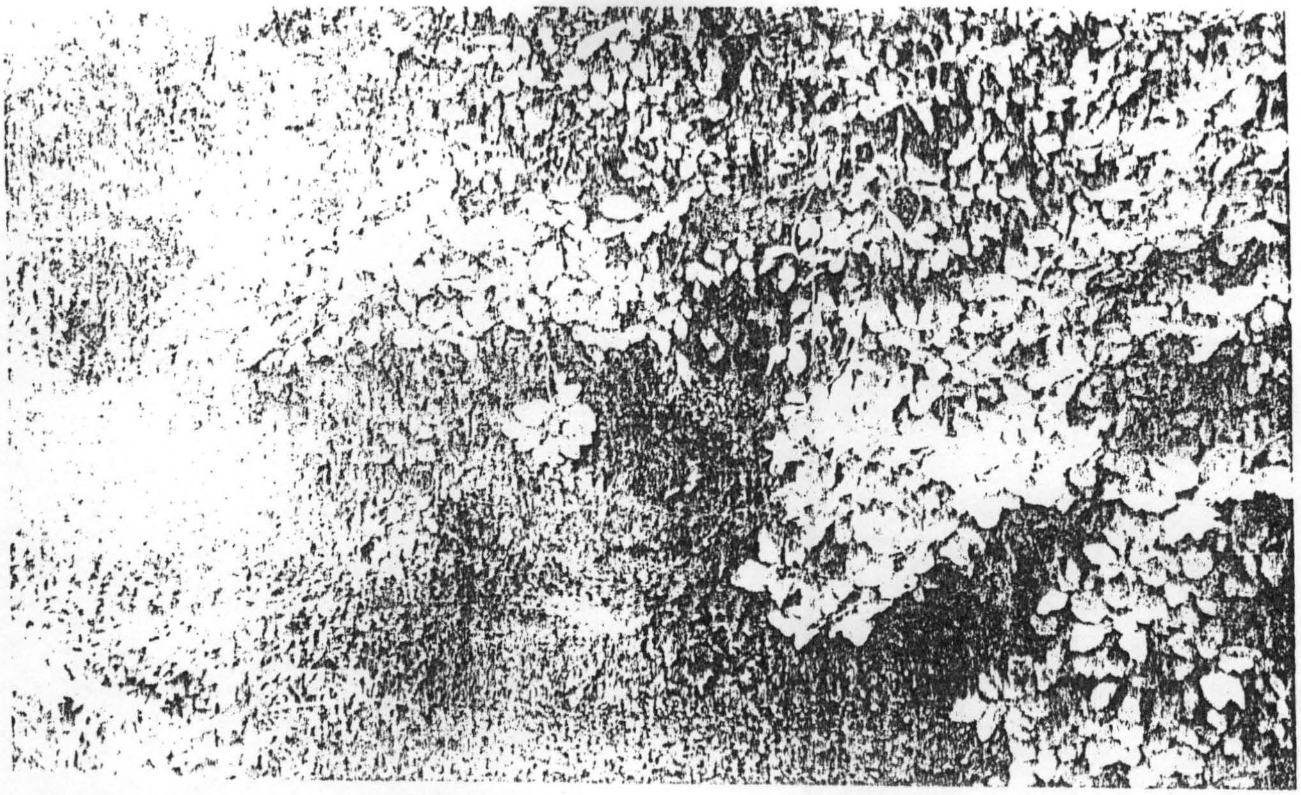


PLATE 9: The already dried River Bwacha

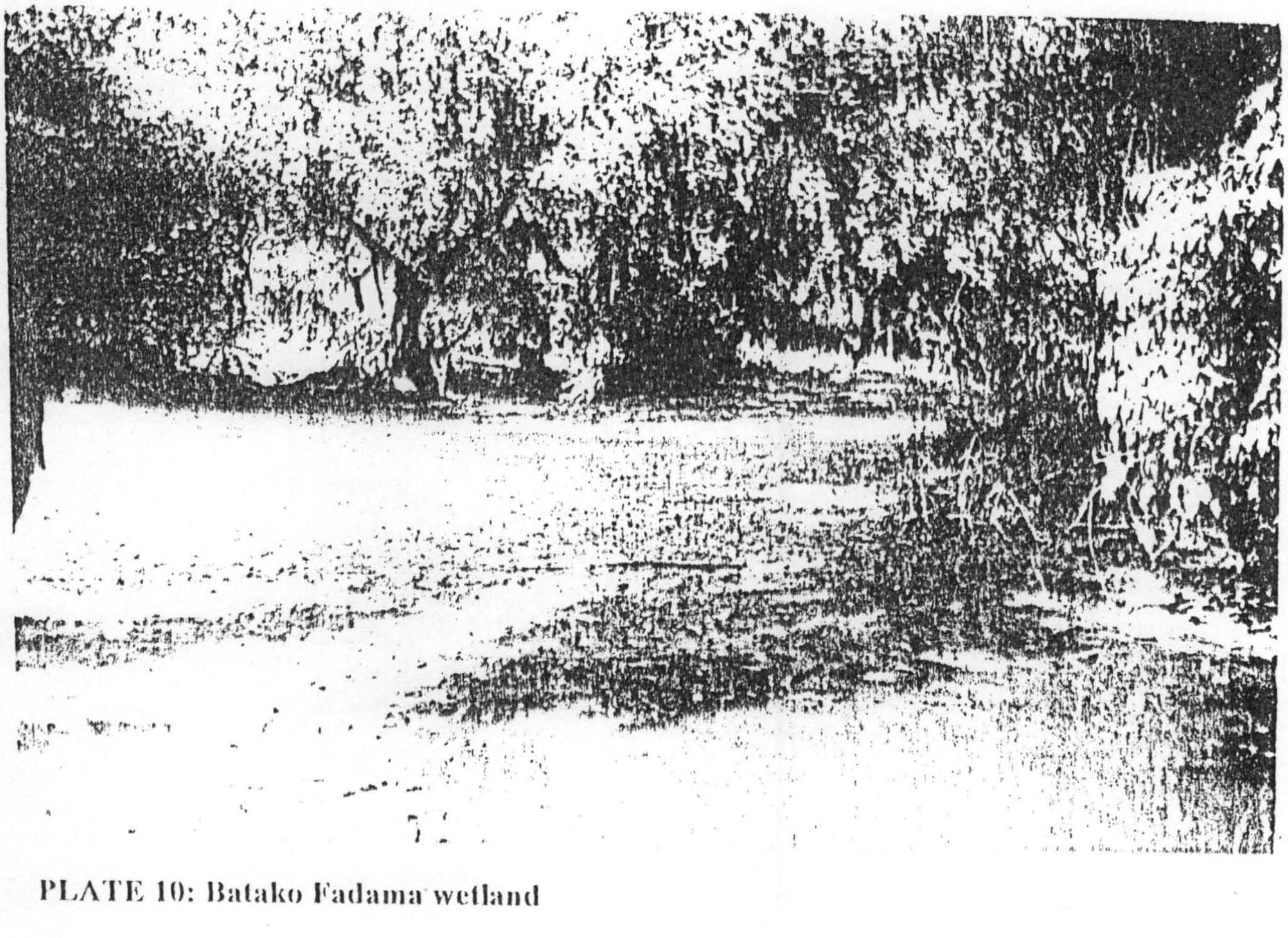


PLATE 10: Batako Fadama wetland

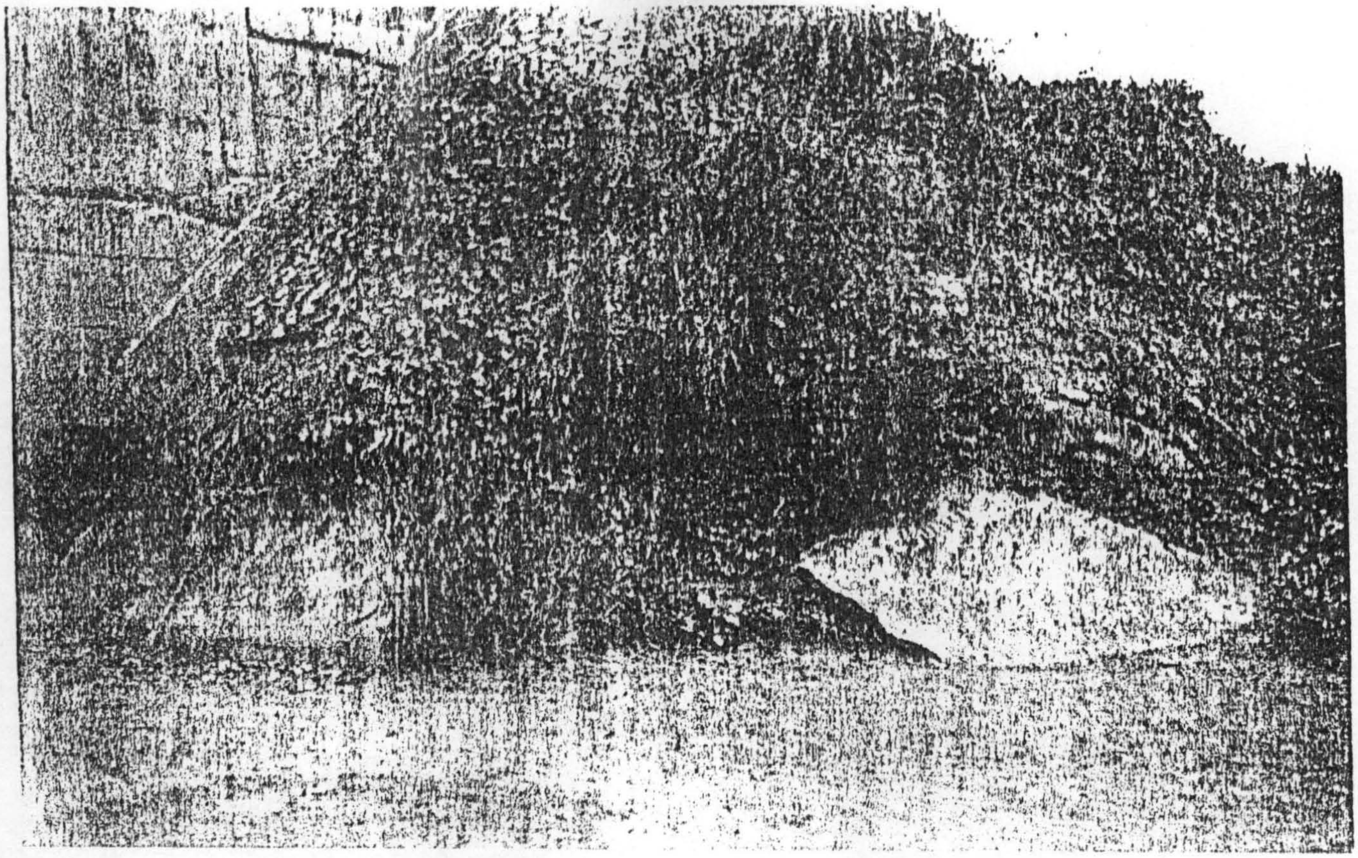


PLATE 11: Bank erosion along River Danko at the foot of the bridge

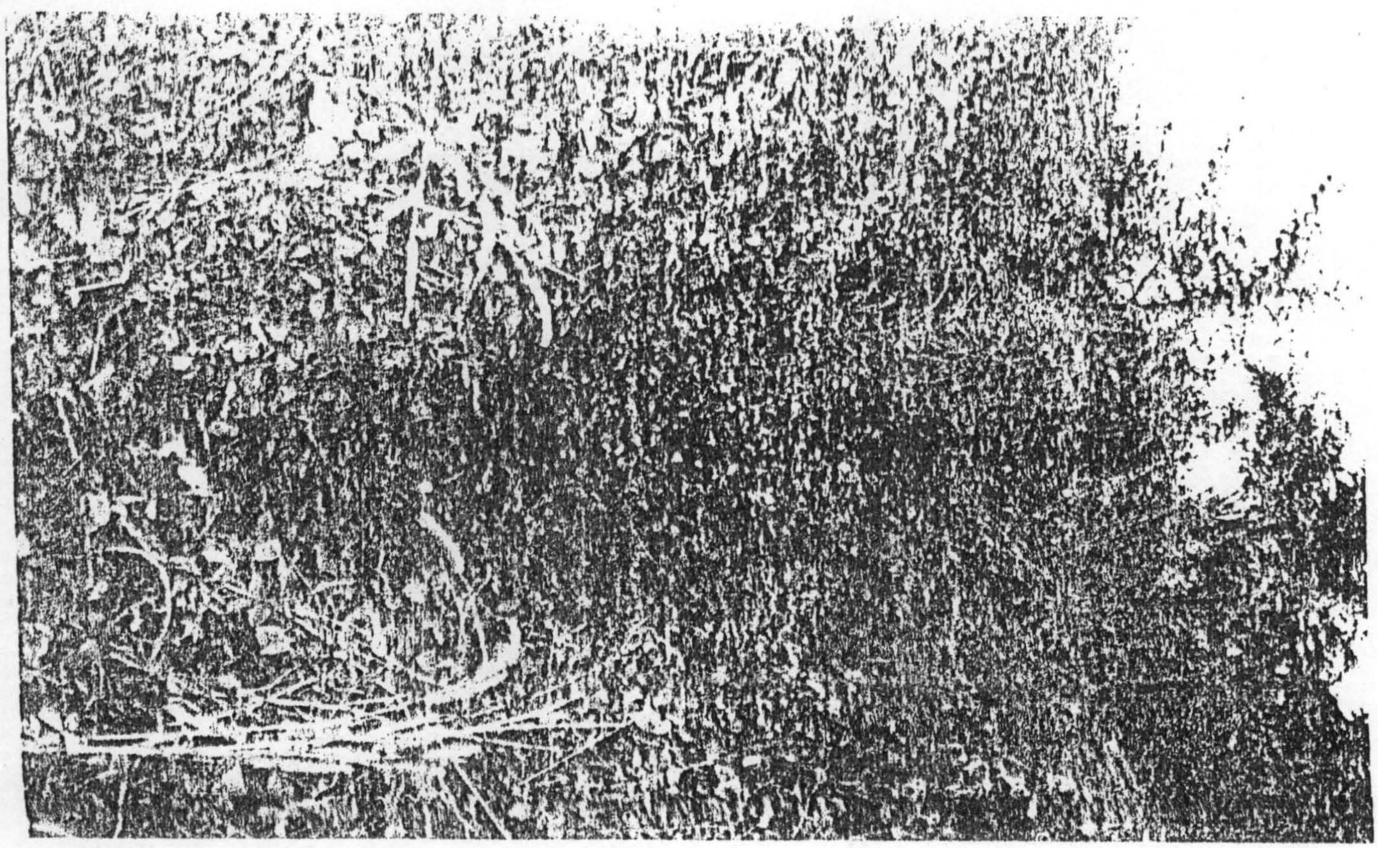


PLATE 12: Incised gully along River Danko

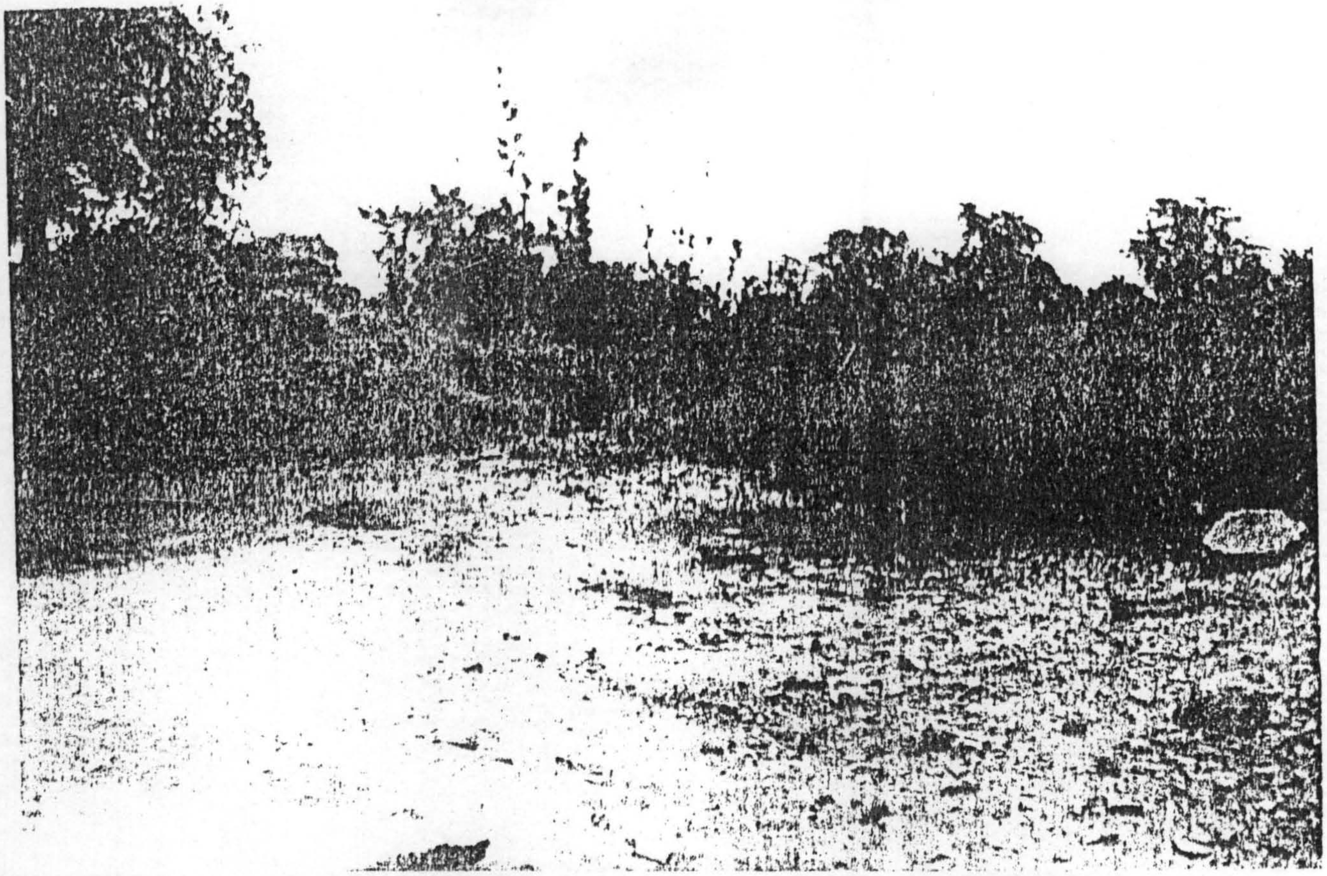


PLATE 13: The already dried River Danko. Note the cattle tracts along the channel.

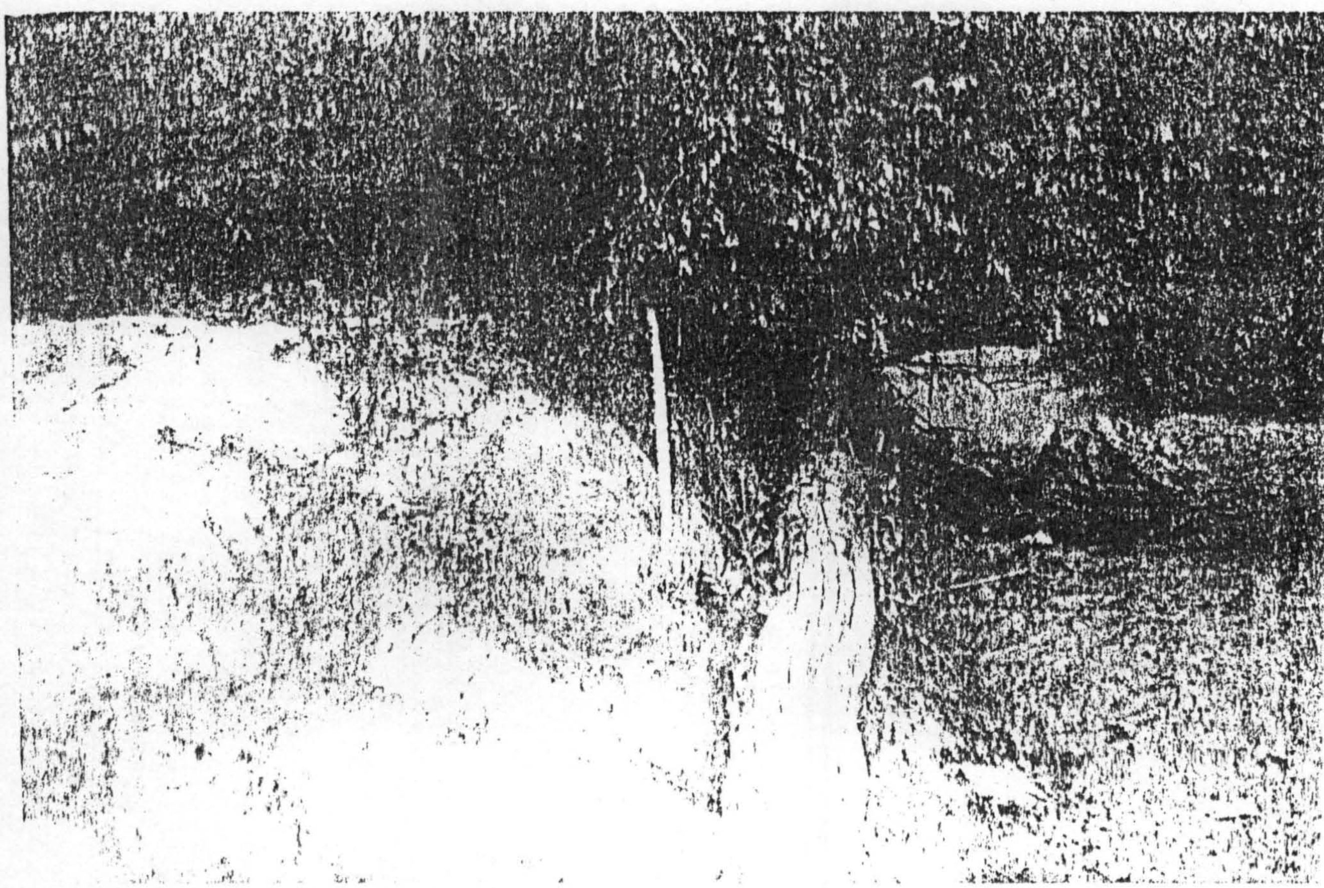


PLATE 14: A threatened tree along River Kawo as a result of bank erosion.

PLATE 15: Cattle tract along the already dried River Kawo.

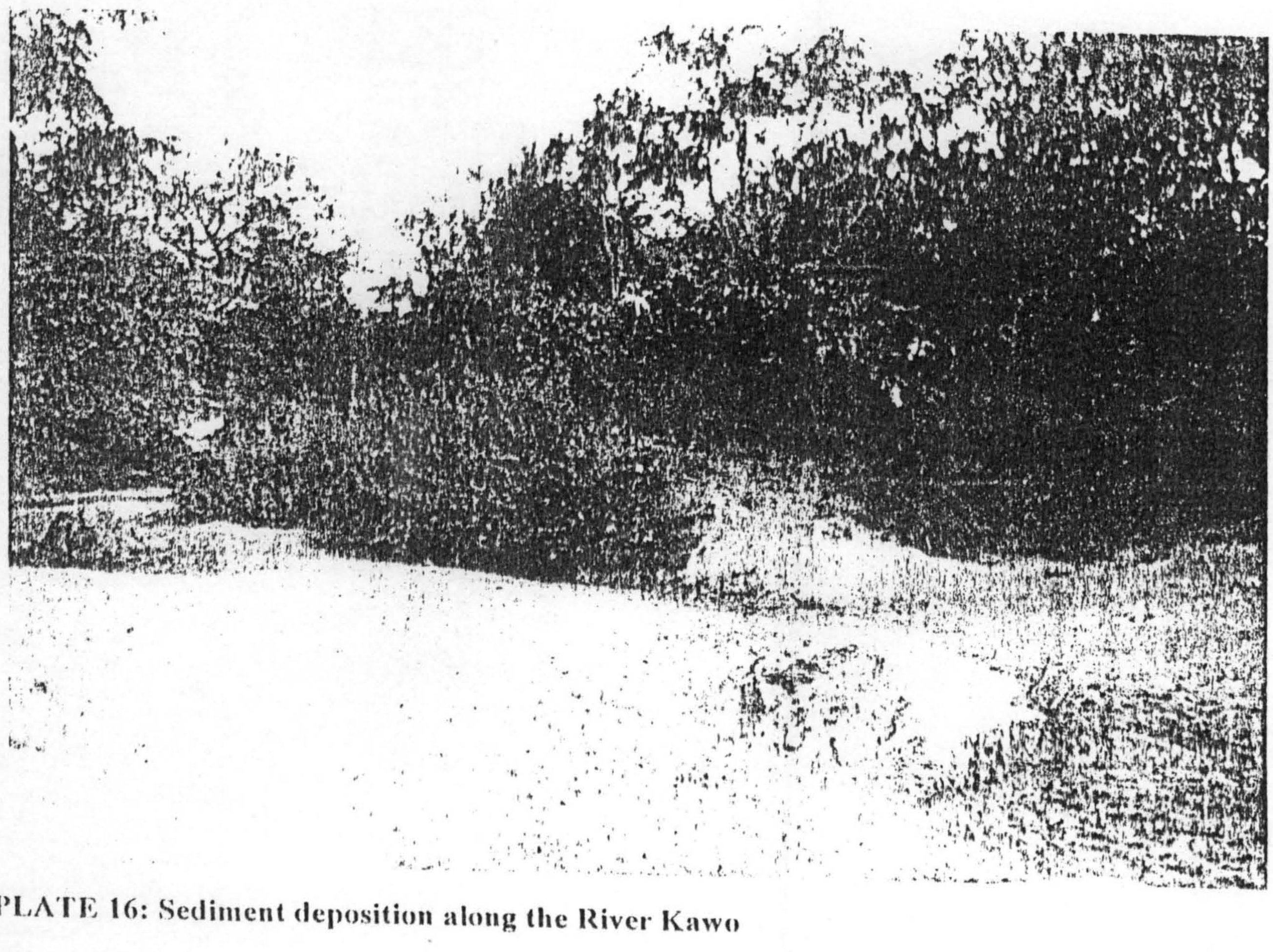


PLATE 16: Sediment deposition along the River Kawo

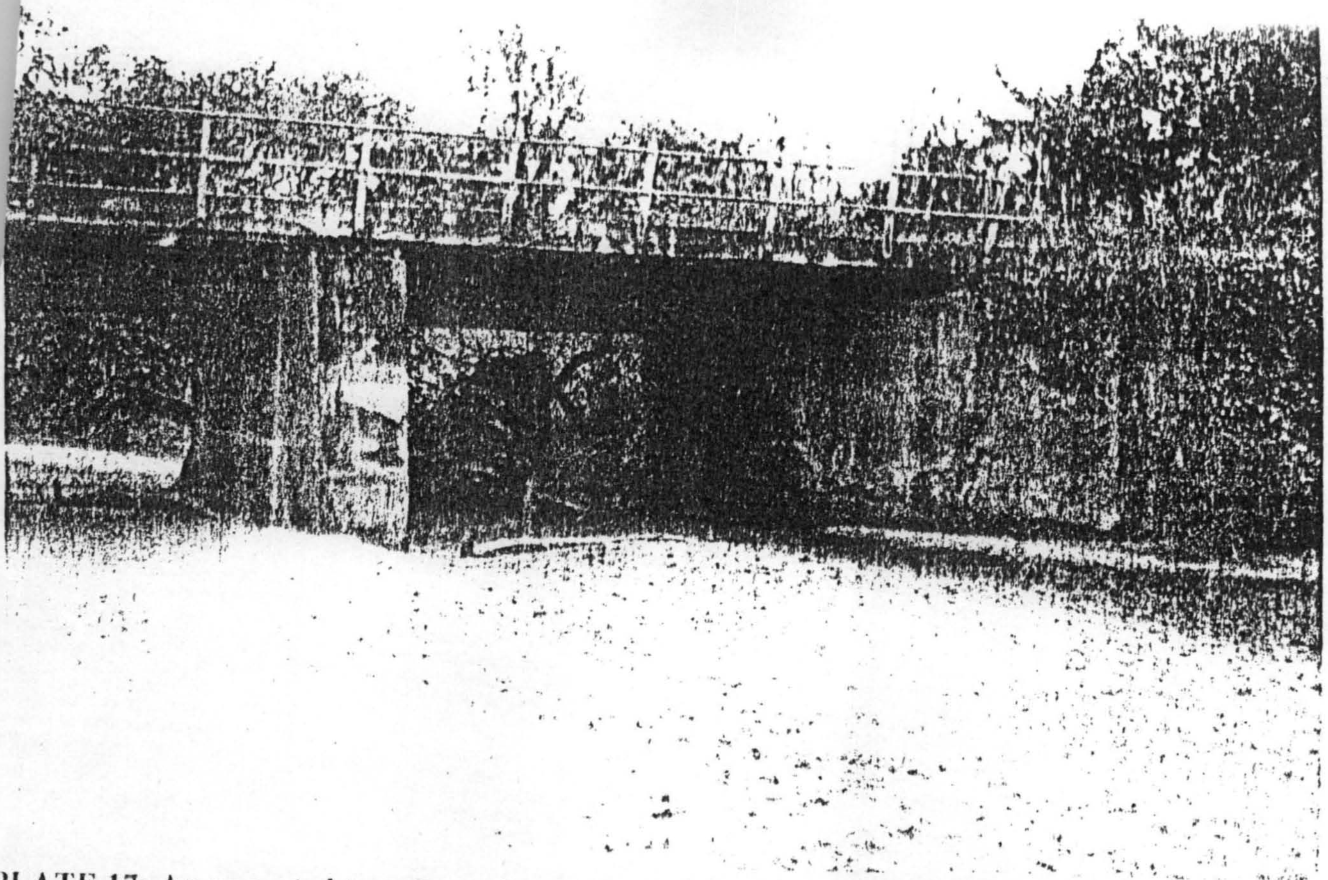


PLATE 17: An uprooted tree due to bank erosion hooked up at the bridge along River Dangana

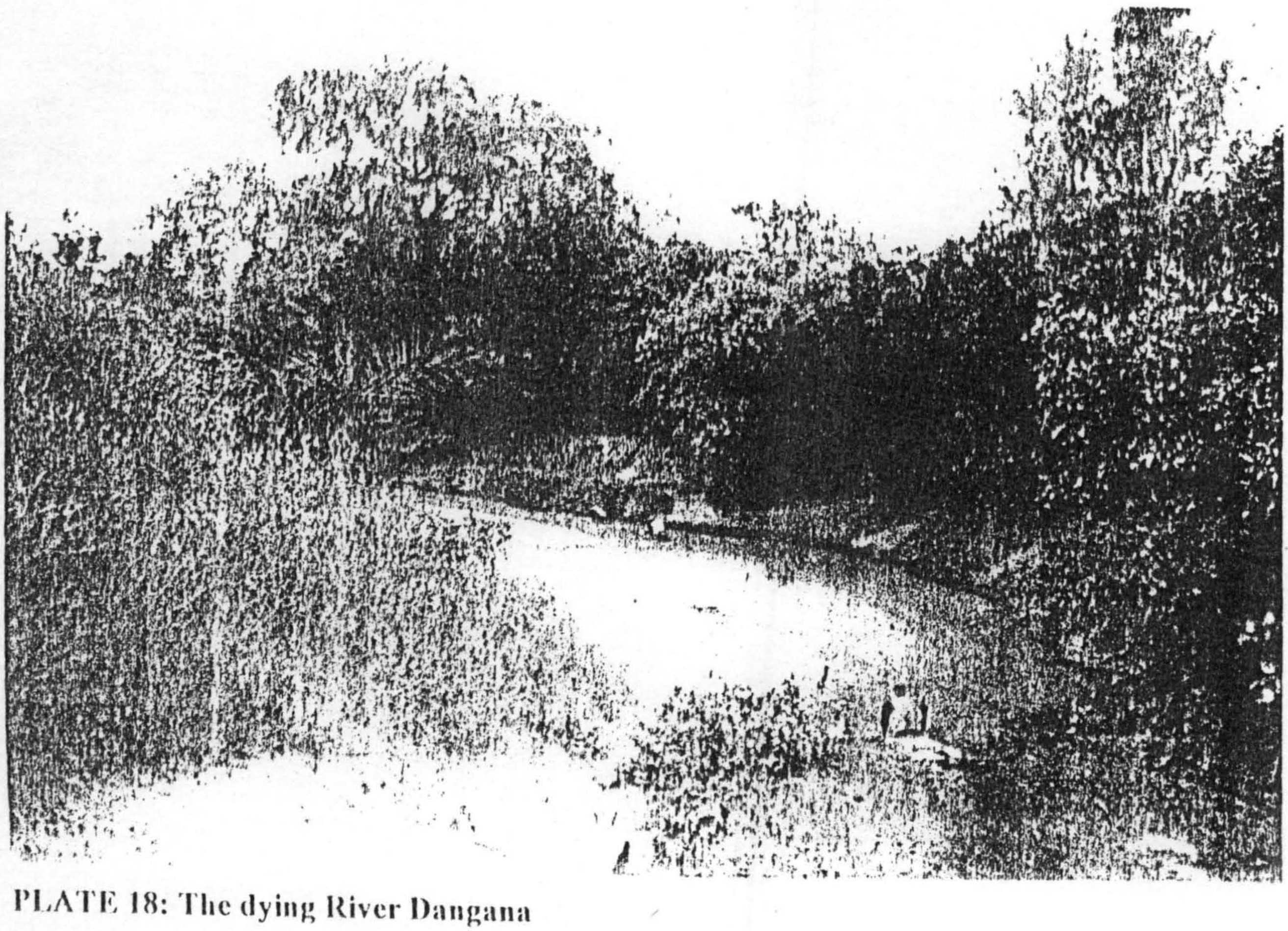


PLATE 18: The dying River Dangana

cattle into the main channel in search of pasture at the fringing forest and water in the channel. In extreme cases, they cut down tree branches to augment for the low grass during periods of drought and extreme dry months. They also construct ponds in the main channel during extreme dry months when the channel becomes very dry so that the cattle can drink from it. Digging of these ponds can be seen in all the Streams/Rivers in the research domain. It is a bad practice that "silts" up of the Rivers/Streams.

3.2.3 **Farming.**

The influx of migrant farmers into virtually all the settlements in the Local Government Area has led to the opening up of land for cultivation. Some of the farmers have infiltrated into the fringing forests close to the rivers/streams. The cultivation of land close to the stream/river banks loosened the soil particles and are easily washed down into the main channel by runoff. The resultant effect is sedimentation of the main channel which obstructs the flow during high discharge causing flooding and erosion. The effect of the gully incision is varied between streams.

Table 2. Mean width, depth and length of incised gullies of some selected Streams/Rivers

S/No.	Name of River	Incised Gully		
		Mean Width(m)	Mean depth (m)	Length (m)
1	R. Kpandaragi	15	5	200
2	R. Dangana	12	7	300
3	R.Danko	6	5	50
4	R. Etsugi	10	4	120
5	R. Bwacha	3	2	40

The farmers who are migrants normally plant Yam, Maize, Guinea Corn, Cassava and beniseed. The Local inhabitants are mostly rice farmers. They also cultivate Maize, Guinea Corn and Sugarcane. At Mikugi Tsaza, they cultivate guards (Calabash) a lot while the Gwari Migrants cultivate yam.

Once these farming activities are undertaken on a large scale, the land or soil becomes loose and is easily washed away.

4.0 EROSION MENANCE WITHIN THE L.G.A.

4.1 Background.

Soil is a permanent resource when it is correctly used, whether to produce crops or to supply other needs of man. But the use of the soil robs it of its fertility and unless this fertility is somewhere conserved or replaced, the soil will become useless and the land rendered barren and unable to support crops or plant growth. In other words, there is a very close link between soil and plant resources. On the one hand, plants depend very largely for their growth on the underlying soil which supports them, while on the other, plants protect the soil from destruction or even death. This relationship between soil and plant resources is best expressed as soil conservation, or the struggle by man to keep soils in continuous use and production. This is done by reducing to a minimum the accelerated loss of soil that attends its use for agricultural production, and by attempting to reclaim waste or badly eroded land. (Faniran et,al 1980).

Soil erosion is as old as mechanized farming. This is evidenced, among other things, by the numerous records of conservation work in different countries, particularly in the developed countries. These attempts at conservation are aimed mainly at preventing accelerated soil loss by surface run-off and, to some extent, by wind. The inadequacy of these efforts lay in the fact that the destructive forces themselves were not clearly understood, while little or no attempt was made to improve the farming methods which were the main causes of soil erosion.

This is where modern conservation practices are different from the older ones: they integrate preventive farming techniques with corrective practices in accordance with the needs and capabilities of a particular area. In other words, modern conservation involves a thorough understanding of the relationships between the various aspects of the land complex. The agricultural methods and techniques and the conservation practices called for.

Soil erosion is commonly defined as the process of acquisition or detachment of material as well as its transportation by water, wind and ice, particularly the first two. Two types are often distinguished: normal geological erosion and accelerated soil erosion. The former is widespread, occurring wherever there is a flow of energy and matter on the earth's surface. It is fortunately very slow, however, and so is not normally injurious to the soil cover of the world. More often than not its rate is slower than, or at worst on a par with, the rate of soil formation. Its effect is therefore rarely noticeable.

The second type of soil erosion is usually associated with man's activities, that is it is man-induced. Because of its often spectacular nature, it is the type that attracts man's attention. Its side-effects include the physical loss of the soil constituents, leading to severe economic loss arising from reduced crop yield or total crop failure, and/or wasted efforts and money spent on unsuccessful soil-conservation projects.

Moreover, accelerated soil erosion may result in a total loss of farm land to gully and other badland phenomena, to accelerated sediment yield and the pollution of stream and sea water, to the silting up of lakes both artificial and natural and to damage to irrigation and other canals.

4.2 Factors that affect soil erosion.

Accelerated soil erosion can be brought about by physical and human agents. The physical factors include the nature of the soil itself, the nature of the land surface, or topography, climate and vegetation cover. The human factors include management practices and the extent of human interference with the balance between the soil-forming and soil preserving factors on the one hand and the destructive forces on the other.

The susceptibility of a soil to erosion, especially the geological or slow kind, is essentially a function of the physical attributes of the area concerned, including the lithology, the structural stability, and the porosity and permeability of the soil; the prevailing climate; the physiography, or surface configurations, and the amount and type of the vegetation cover. The various attributes of the soil which influence its erosive capacity are sometimes considered together as the soil's structural stability. This governs the resistance or otherwise of a soil to the various destructive forces. Soils which break down and so get washed away readily are said to be of low resistance, or structurally unstable, while those which do not detach readily and so are difficult to transport, even when parts are broken away, are structurally stable. The concept of soil structural stability therefore involves all the physical as well as the compositional properties of the soil. These include the degree of surface compaction and/or protection, its textural characteristics, infiltration attributes and the nature of the erosional agent. The degree, length and form or shape of slope are also critical.

Soil detachability tends to increase with decreasing soil particle size. Soils with large stable particles, such as sand grains or iron-cemented aggregates, seldom erode, because the erosive forces are rarely strong enough to remove them.

By far the most important agent of soil erosion is water, whose effectiveness is strictly controlled by the nature of the run-off, which is itself controlled by the rainfall intensity, the rate at which water percolates through the soil surface in relation to the rainfall intensity, the degree of soil permeability, and the nature of soil aggregation and surface compaction.

Soil erosion is most intense in semi-desert or grassland environments, where rainfall is sufficient to produce run-off and where vegetation is not thick enough to offer effective protection for the soil.

Soil loss on slopes tends to vary with both the degree and length of slope, but the rate of soil loss increases more rapidly than either the slope angle or the slope length. Soil erosion rates differ on convex, concave and straight slopes. By far the most conducive to rapid soil loss is the concave slope, which is often badly gullied. Soil loss also increases with increasing surface drainage.

Finally, a vegetation cover protects soils from being eroded. It does this by protecting the surface of the soil from direct raindrop impact, by reducing the quantity of rainfall that reaches the soil surface to contribute to run-off, and by improving the soil structure and so increasing the infiltration capacity of the soil, thus further decreasing run-off. In many instance no surface run-off takes place at all under forest vegetation. Soil stability is also supported by the roots of trees and grass.

The human influences in the process of soil erosion include farming, grazing, and mining and engineering constructions, each of which involves the clearing of vegetation. The effect of these activities is felt most quickly in marginal areas (semi-arid regions, for instance), where the scanty vegetation is soon destroyed by over-grazing or over-cultivation, leading to the exposure of the soil to the full erosive forces of water and wind.

Agriculture is the most important cause of soil erosion. Agriculture, particularly arable farming, involves the removal, wholly or in part, of the original vegetation. Thus, depending upon the extent of this initial clearing, the nature of the crop(s) grown, the cropping system, the type of instruments or implements used and the intensity of the cultivation, soil loss by erosion may be more or less serious. Observations suggest that by far the highest incidence of soil erosion occurs on bare or clean-tilled fallow land, especially if ploughed at the beginning of the fallow period. By contrast, soil erosion is generally less serious on soils fallowed after several years of perennial grass cover.

The system of farming in vogue is also very important, though different systems have evolved in different ecological environments. The systems of cultivation common in the tropical world are still often described as 'primitive' when compared to those in the temperate lands, particularly in the advanced nations of Europe and North America.

Opinion is divided, however, about the relationship between the 'primitive' system (shifting cultivation and/or bush fallowing) and soil erosion.

While some people say that they are destructive, others suggest that they are well adapted to the environments in which they are practised. The truth of the mater seems to be that, depending upon the extent of disturbance to the vegetation cover, the so called primitive systems may or may not cause accelerated erosion. The critical issues seem to be the length of the fallow period and the cropping system. Where mixed cropping is prevalent, so that the soil surface is never exposed for a long period of time, and also where the cropping system is so short and the fallow period so long, so that there is complete or almost complete regrowth of the original vegetation, shifting cultivation and bush fallowing will not cause any more accelerated soil erosion than the so-called scientific farming systems of the developed countries. But where the farm plots are clean-tilled and grown with single-row crops, or where the fallow period is short and the cultivation period long, so that vegetation regrowth is jeopardized or rendered impossible, soil deterioration is rapid, leading to a depleted vegetation cover and consequently to accelerated erosion.

This situation is true of many developing countries at the present time where, as a result of rapid population increase and lack of alternative sources of employment, pressure on the land has increased soil erosion. It is likely that those areas in which accelerated soil erosion is traceable mainly to faulty farming systems, have led some observers to the conclusion that these systems are necessarily bad. But, given the type of farming implements (hoes and cutlasses), the widespread practice of mixed cropping, the generally short periods of cultivation followed by long fallow periods, which in ideal situations characterize the bush fallow or shifting cultivation systems, it is unlikely that the system is bad of itself. It is other factors which are likely to have contributed to the intensified soil erosion. The introduction of heavy machinery, total clearing, single-row crops and intensive cultivation all seem to have brought trouble to the traditional stem of farming in the developing countries of Africa, Asia and Latin nerica. (Faniran et al, 1980).

The proper method of farming or land management is as yet only und in the ideal situation of experimental plots, where it is possible to ipulate accurate timing of farming operations, the proper orientation of ops in relation to the slope of the land, the proper handling of crop esidues and the application of fertilizers. On such plots soil erosion is ninimized, while deviation from their practices means serious soil erosion. he main problem of agricultural practices in underdeveloped countries is hat very few, if any formal or standard conservation practices are known or ormally implemented. Little or no information is available on the causes and rate of soil erosion and soil loss, while a high premium is placed on nature and the natural regeneration of vegetation and soils.

Apart from agriculture, other activities of man induce or accelerate soil erosion. Two such are mining and civil engineering constructions. Mining is not practiced in the L.G.A. but civil Engineering works especially the drainage net work within Lapai has brought in some undesirable effects at the downstream locations.

4.3 Soil Erosion in the L.G.A.

The agents of soil erosion include running water, wind, ice and gravity. The one of running water is of concern and applicable to the L.G.A. at the moment. Wind erosion is more pronounced in arid and arid environment while ice is to be found in temperate environments.

Soil erosion by water is far the most important agent of soil erosion, affecting most parts of the world, except perhaps in the true deserts and the ice-capped polar regions. Soil erosion by water is also very destructive, and because it occurs in the areas where agriculture is most widespread (that is, where it rains), it offers a very great threat to man.

Because of this, the processes involved in water erosion and the possible ways of checking it have been widely studied, particularly raindrop impact and surface flow.

Soil erosion by raindrops is also called rain-splash erosion. On impact, the raindrop splashes some of the soil particles upon which it drops, moving them both vertically and horizontally. The quantity of soil removed is a function of the available energy in the raindrop and of the resistance or otherwise of the soil in question. The available energy of raindrops is principally related to their size and frequency, that is, to the rainfall intensity. Generally speaking, the erosive power of raindrops increases with increasing rainfall intensity, particularly with increasing drop size and drop velocity. Soil texture, structure and stability determine how much soil will be displaced by raindrop impact.

Other factors which affect the amount of soil loss due to raindrop erosion include topography and vegetation cover. On level surfaces the splashed materials tends to scatter uniformly over the surface in all directions, especially when the raindrop itself has a vertical drop. But when raindrops strike a sloping land surface, the major portion of the splash moves downhill. This means that greater quantities of soil are displaced down slope. The result is that more soil erosion occurs on steep slopes than on gentle slopes. Vegetation intercepts the rain and so reduces erosion. Soil erosion is therefore more serious on open field than in vegetated areas.

Raindrop erosion affects the soil by detaching soil particles, which makes it easier for the transporting agent, such as running water, to remove them, and because it effects soil elutriation (this is the washing out of the fine soil particles, which also contain the most valuable parts of the soil, leaving behind the stone and other coarse soil particles). Finally, splash erosion breaks down soil clods and clumps, causing them to lose their organic matter and other valuable constituents.

The second way by which water erodes the soil is by surface flow. This happens when the rate of precipitation exceeds the rate at which the water soaks into the ground surface. Surface flow may be in sheets, or it may be a channelized flow. Sheet erosion is the more or less even removal of thin layers of soil from a sloping surface. It is therefore a less conspicuous type of erosion. Its effects are, however, cumulative and become noticeable after some time if it is not checked.

The boundary between sheet and channel flow, particularly rill flow, is very difficult to draw precisely. Rills tend to form as soon as surface flow begins, varying in size from minute channels to readily observable ones. Minute rills join to form what looks like sheet flow. It is more common for rills to join together farther down slope to make larger channels or gullies. A gully, by definition, is a channel cut so deeply into the underlying material that the surface cannot be easily smoothed out. Gullying is a very serious form of soil erosion on agricultural lands.

The rate and extent of gullying in agricultural lands are closely related to the site and hydrogeological aspects of the area. Among other things, the rainfall has to be heavy enough for the large quantities of run-off water to detach and transport the soil material; the soil has to be deep, loose and light, like the alluvial and colluvial deposits of the Lapai-Duma and Duma – Bwacha axes.

PLATE 19: Gullying on the outskirts of Lapai Town from Paiko road

PLATE 20: Gullying downstream at Unguwan Hausawa. Note the threat to houses on both sides

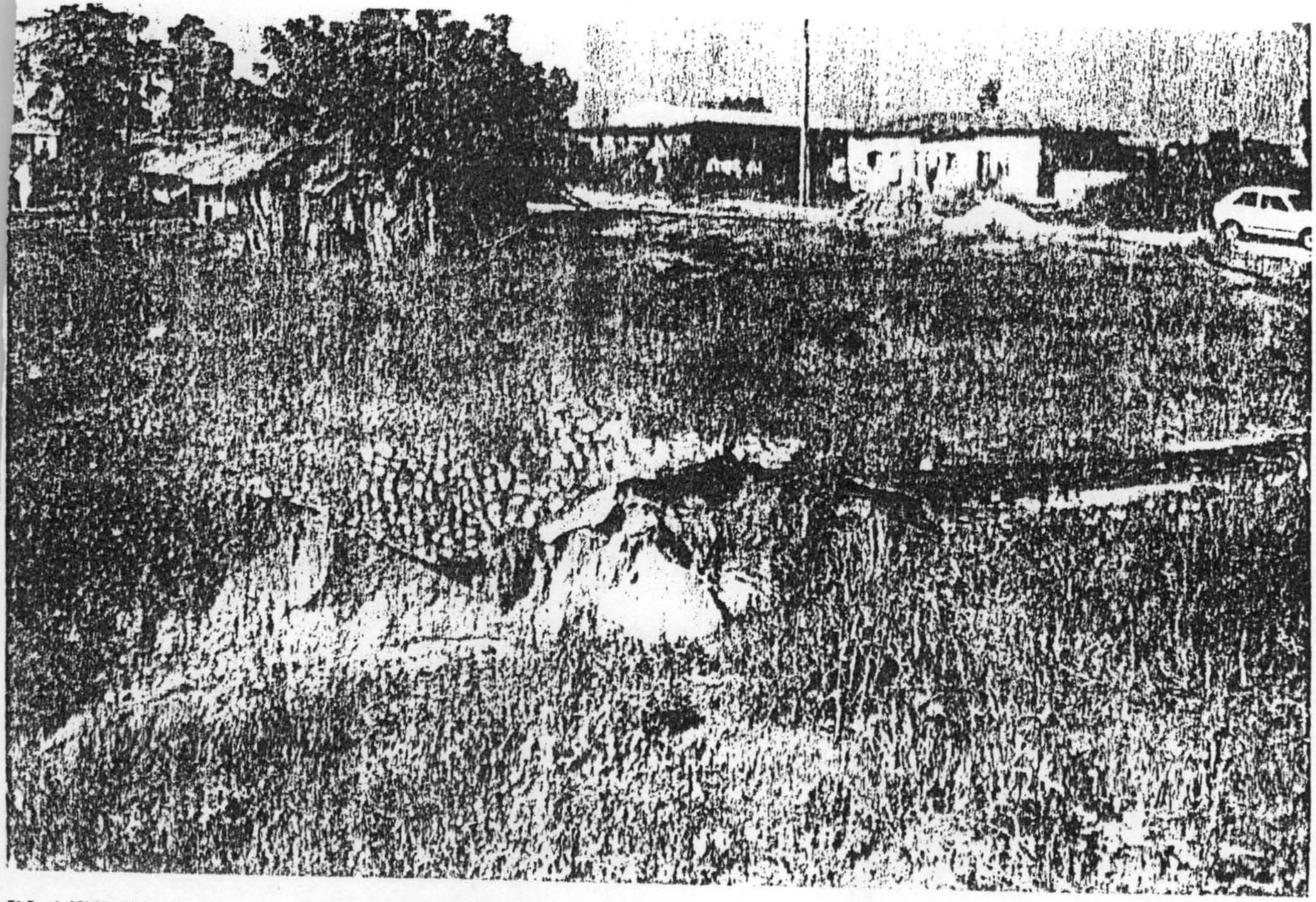


PLATE 21: Serious gullying downstream at the channellized stream at Unguwan Kaftere

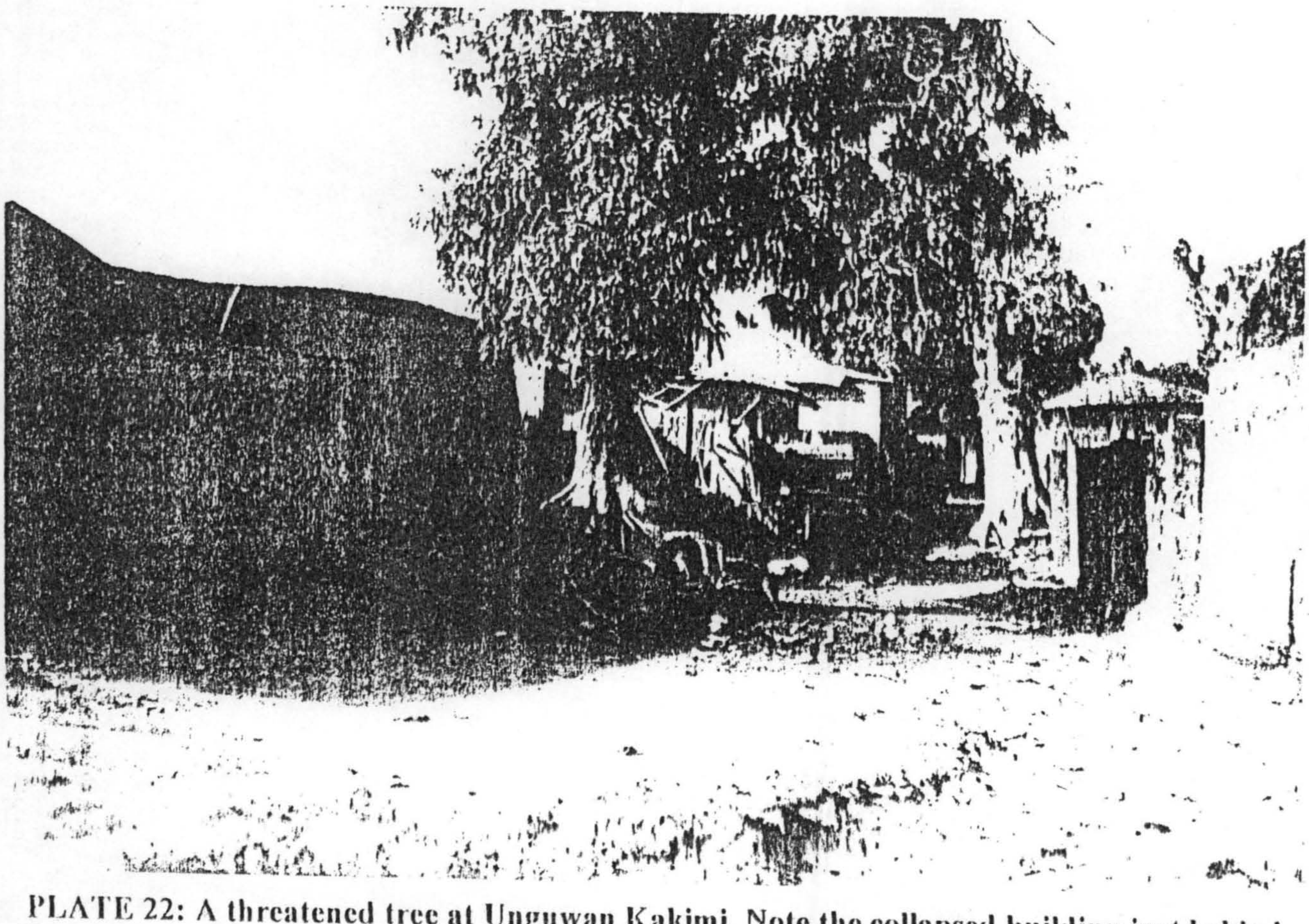


PLATE 22: A threatened tree at Unguwan Kakimi. Note the collapsed building just behind the tree.

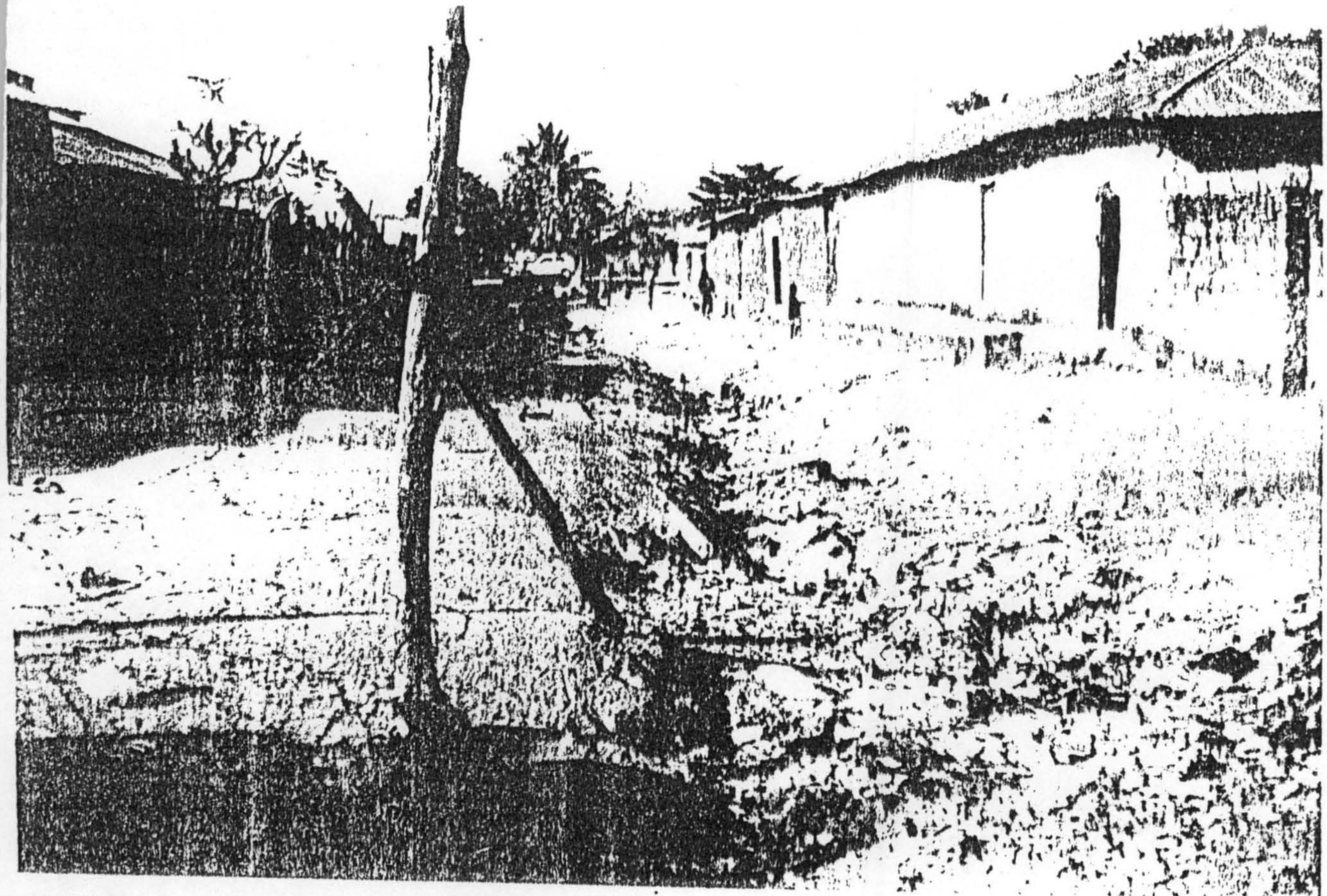


PLATE 23: Gully initiation at Unguwan Hakimi

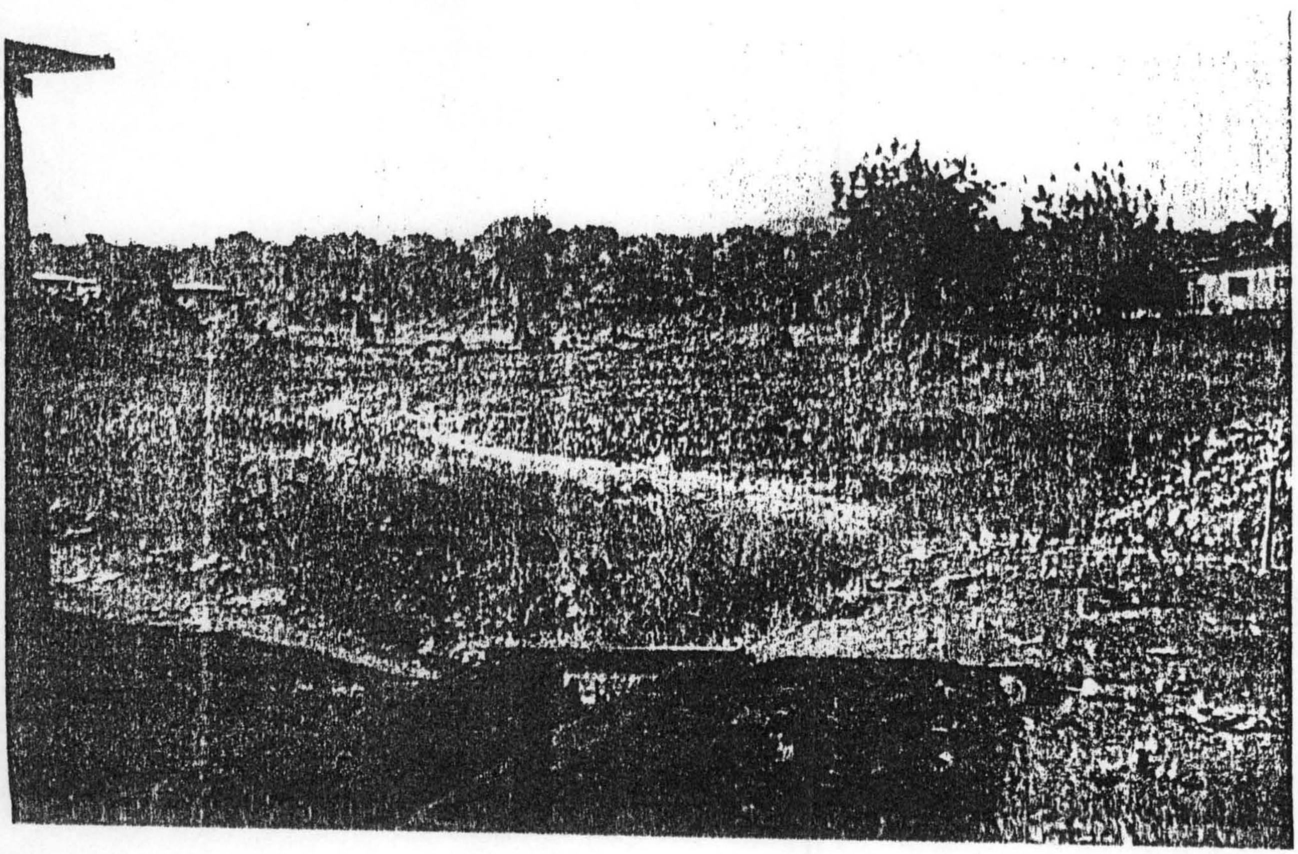


PLATE 24: Note the wide channel downstream from Haske Primary School.

The gullies within Lapai town necessitated the construction of drainage network to solve the problem. The construction of the drainage network was completed in the early 90s but brought in its wake undesirable and unforeseen impacts at the downstream location. At Unguwan Hausawa many houses are threatened seriously at the downstream location of the drainage which terminated at the western axis. The gullies created have extended to the foundations of many residential houses and some have even collapsed. The length of the gully at this end is over 150m with a depth of 1.5 and the width measuring over 10m. Many water reticulation pipes and roots of trees are exposed.

At Unguwan Hakimi, the major erosion sites are about three. Two are located at the Eastern part of the area while the other one is located at the South western part. As a result of the loose lateritic soil of the area, the gullies have extended to the foundations of some buildings and rendered them uninhabitable. Some of them have even collapsed. There is no single drainage network in this part of the area.

Close to Abdullahi Kure's house, the erosion at the downstream location of the drainage is pronounced. It is over 15m wide and 10m deep and stretched over 200m. The one close to Haske Nursery/Primary school exhibits the same physical characteristics.

At Unguwan Kaftere, the gully at the bridge is over 20m deep as a result of the "gorge" created by the fast flowing stream upstream. The gully is over 30m wide and stretches over 1km.

One other area that is of serious concern is on the North eastern part of the town on approach to the town from Paiko. The gully erosion has an extension of over 150m with a depth and width of 7m and 5m respectively.

There is no single drainage in this area which might affect many residential houses at the right hand flank.

The gully erosion within Lapai town can be said to assume a catastrophic dimension at the downstream locations of the drainage network and also some areas that do not have any form of the drainage could be referred to as ecologically blighted areas. The drainage network should be extended further downstream and also where it does not exist, construction work should be started in earnest to ensure that the environment is conserved.

5.0 The threatened Kpashimi forest Reserve.

The Kpashimi forest reserve is a gazetted forest reserve with an areal extent of 197.23sqkm and was once under management conservation and community driven project. The reserve shares border with Azza L.G.A. It also severs as a "Corridor" for migratory animals into the Yaba forest reserve in F.C.T. The major settlements found at the fringes of the forest reserve include Lafiyan Kpada, Kunko, Zago, Kapako, Kpashimi Nassarawa and Mayaki. In all these settlements, many migrant farmers in their hundred have come to settle in each of these locations in search of new land to cultivate their crops while some were driven by the necessity of crisis and political upheaval especially those from Nassarawa State. The virgin land that abound in these fringes provide opportunities for expanding their agricultural land and cultivate more crops. This invariably means cutting down of more trees and clearing the vegetation. Some of the migrant farmers are also hunters who have been found to invade and kill games in the forest reserve. Between the 60s and 70s different varieties of flora and Fauna were abundant in the forest reserve. With the influx of these migrants especially around the fringes of the forest reserve, these exotic flora and fauna have disappeared. The forest reserve use to be rich in wild game such as buffalo, Crocodile, Monitor Lizard, Monkeys, boa constrictors, wildfowls, Hyenas and deers. Most of these animals are now restricted to some marginal areas within the forest reserve while some have become extinct within the reserve.

The reserve is endowed with many economic trees such as Chlorophora Excelsa, Celtis, Afzelia Afticana, Daniellia Oliveriri, Lophira alata, Parkia Buty rospermum. Some trees have been found to be of high medicinal value such as Piliostima, Plumeria alba securidala, Taraminalia glaucoscense. Most of these flora have been illegally cut down for either fuel wood or timber.

Even though the forest reserve is protected by law, some illegal timber prospectors and poachers have infiltrated into the forest reserve to carry out their bad activities. The forest reserve as it is, has undergone some charges with over 20% of its vegetal cover being depleted. It is unfortunate to observe though that during this particular study, some officials of the forestry department either conive or partake in the illegal felling of tress within the Kpashimi forest Reserve. If the full tourism potential of the forest Reserve is to be realized, then this illegal felling of tress should stopped. This can be done through enlightenment campaign to raise the awareness of the local inhabitants on the dangers of illegal poaching and felling of trees. If the Local inhabitants are to benefit from the abundant natural resources of the forest Reserve, it should be done in a sustainable way.

6.0 THE THREATENED BATAKO FADAMA WET LAND.

This particular Fadama wetland is not Gazetted and even though covers only about 6KM^2, It is a Fadama wetland endowed with diverse species of flora and fauna. Its major source of water is the River Danko which has been discussed previously. The past two decades saw the fadama wetland as a safe haven for different species of flora and fauna. The flora are of both economic and medicinal value. The fauna include different types of reptiles and amphibians of which are boa constrictor, Python, wild board, Monitor Lizard, fish of different variety e.t.c.

The River Danko which is the major source of water to the wetland has become seasonal and as a result, affected the re-charge of water into the fadama. This has adversely affected the population of water loving animals that once occupied the area.

The vegetal cover within the fadama has been drastically reduced as a result of farming activity. Farmers in their hundreds now cultivate rice on the rice alluvial soils of the flood plain and at the upper part, they cultivate maize and guinea corn. This action has given rise to the "silting up" of the main channel also. During the study in early December, it was observed that only "pockets" of ponds were scattered around the main channel.

The activities of Fulani Nomads can not go unnoticed as their cattle make tracks along the main channel in search of grass and water. The affermath of this is also glaring as it causes the River to silt up.

7.0 CONCLUSION AND RECOMMENDATIONS.

7.1 Conclusion.

The study has identified some ecologically blighted areas to include Lapai-Kpashimi, Lapai-Saminaka and Lapai-Nassarawa axes where farming, lumbering, poaching and bush burning are rampant and widespread.

The streams are drying up at an alarming rate. The streams / Rivers that were once perennial are now seasonal. The causative factors identified were farming, lumbering, overgrazing and bush burning. All the Rivers including the perennial ones are under serious threat of dying.

The erosion menace within the Lapai township has assumed serious dimension as locations downstream of the drainage channels have been found to be under serious threat.

The Kpashimi forest Reserve and the Batako fadama wetland have been degraded to such an extent that the flora and fauna that once occupied these areas are either extinct or restricted to marginal areas.

7.2 Recommendation.

It is recommended that:-

- A strong legislation should be imposed on the Kpashimi forest Reserve by the forestry department.
- Construction of drainages further downstream within Lapai town should be carried out in earnest and those areas that do not have at all should also be considered.
- The activities of Migrant farmers, fuel wood/timber exploiters should be checked to ensure that they so not deplete the vegetal cover in an environmentally unfriendly way or unsustainable manner.
- The Batako fadama wetland should be protected to ensure its conservation.

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