THE USE OF VEGETAL COVER IN SOIL EROSION CONTROL

A CASE STUDY OF BADEGGI IN KATCHA LOCAL GOVERNMENT NIGER STATE

BY

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CERTIFICATION

I hereby certify that this work has been supervised, read and approved as meeting part of the requirement for the award of PGD Environmental Management Technology of Federal University of Technology, Minna. Niger State.

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DEDICATION.

This is dedicated to my grandmother Late Hajiya Nna Habiba for her up bringing and moral support, which gave me the source of inspiration. May Almighty God reward her.

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CHAPTER ONE.

1.1. INTRODUCTION.

Erosion is the displacement of soil material on the ground surface by the action of moving water or wind. Water erosion caused by water movement on the ground surface. Movement of wind causes wind erosion.

Soil erosion is a natural process. A distinction is usually made between geologic and accelerated soil erosion. The former involves the slow removal of soil by various denudation agents such as running water, wind, ice and waves under natural environmental conditions. However accelerated soil erosion mainly occurs where man has tampered with the environment especially through the removal of vegetation.

Because of the spectacular nature of the accelerated soil erosion and its devastates effect on the environment, it is the types that attracts man's attention. In fact man's activities such as mining, over cultivation and water erosion occur in many areas when the soil is not properly protected. Heavy rainfall can completely wash away the fertile top layer. Tree crown provides adequate protection by reducing the speed with which raindrops hit the soil.

A layer of under growth is necessary because rain which collects on the crown and falls in large drops can cause splash erosion. A small amount of erosion may occur through stem flow.

Vegetable cover plays an important role in erosion control especially trees in hilly areas. Trees help prevent shallow landslide on slope. Tree can be planted in rows following the contour lines.

These rows should contain abundant undergrowth and litter. Eroded materials from higher up will accumulate in the rows eventually leading to the form action of natural terraces.

A part from being effective against erosion deep-rooted tree can penetrate, compact and cause hard soil layers. This increases the porosity thus improving the water holding and infiltration capacity as well as the aeration of the soil. It has become important in maintaining stability in ecosystem.

1.2. TYPES OF EROSION

RILL EROSION

This is the removal of soil by water from small but well-defined channel or streamlets when there is a concentration of overland flow. It occurs conventionally large and stable to be readily seed. Tillage operation can easily remove rill erosion.

GULLY EROSION.

At some point on the slope sufficient over land flow may accumulate to cause a mall river let., if turbulence in the flow is strong enough to dislodge particle from the ed and bank of the channel.

SHEET EROSION

This is the relatively uniform removal of soil in thin layers. Sheet erosion is ifficult to detect except, as the soil surface is lowered bellows old soil mark on fences.

.3. PROBLEM OF SOIL EROSION.

Some of the problems of soil erosion include the loss of topsoil, sedimentation nd siltation of reservoirs ravines and gullies which threaten lives and properties. For nstance, soil erosion leads to loss of topsoil, the most fertile part of farmland. This incident is responsible for most of the degradation problems in some African countries. All forms of land degradation lead to a decrease in soil fertility and crop production capacity.

In fact Nigerian mean annual loss through erosion is estimated to be about 25 million tones [Salau, 1995]. The eroded material from different inter fluvial surfaces are eventually washed off in to various river channels. The end result is that many of the river courses become shallow and reduce their water bearing capacity. Sedimentation and siltation of reservoir lead to flood encourage weed problem and Render River useless for navigation. For examples, the collapse of several slams has been attributed to siltation and sedimentation problems.

The severe erosion, which manifested in the ravines and gullies have destroyed the landscape and rendered them almost useless for several valuable uses. For instance, gullies have been responsible for some of the spectacular bad land topographies in Eastern Nigerian e.g around Nsukka and Awka..

Gully has equally developed on the ridge sides as in the case of Auchi in Edo State. It may also develop on some road sides and may drains valley floor. Gully morphology varies from place to place. In the upper reaches most of the deep gullies are characterized by U-shaped channel cross section while shallow gullies have V-shaped cross sections although with steep wall slope. These are exemplified by most of the gullies in Auchi and Effon Alaaye and other towns which soil erosion has manifested in the form of severe sheet and gullies [Jeje, 1996].

Severe erosion have also threatened life and properties. For example, may houses have collapsed. Roads and communication equipment have been endangered. Also, soil erosion cause many types of serious damage to farmland and settlement. However, there is the need for soil erosion mitigation.

Soil erosion is an expression of stress on the soil masses which as far-reaching consequence on man and lies environment. In Niger State of Nigeria soil erosion has ravaged about 120,000km^2 of land area. 8 villages have been destroyed and 30,000 people had to be resettled. Furthermore, recently, erosion caused loss of 20 metric tons of fertile soil which amounted to over 300 million naira per annum with gullies extending to the depth of over 120m deep and up to 2km wide in some places.

The affected areas in state are Baro, Mokwa, Badeggi and parts of Katcha area.

1.4. CONTROL OF SOIL EROSION

Various conservation measures have been taken at various levels to deal with the problem. Two broad measures of control curative measures and preventive measures. A combination of forestation, ridging, contour ploughing, bounding [terracing] the construction of side drain to soak-away pits and the construction have usually been applied on sheet erosion. The emphasis is on reducing the extent of bare soils in any area and by planting tress in such areas, to grasses such as Bahama grass and shrubs, such as Acioa barteri, cover crop as well as other local varieties. In the case of wind erosion emphasis is again on limiting the tress shrubs etc] to check the process.

Other measures include limitation of the extent of forest degradation by evolving a system of cultivation, which will always ensure that the ground surface is under effective cover of vegetation controlling the extent and timing of bush and effective use of cover crops.

Other measures for controlling soil erosion problems relate to further research on erosion control especially the monitoring of erodibility ratio of different surfaces. Also there is a need to document the areas which are prone to erosion and the extent of soil erosion in these areas. With this type of effort maps can be produced and proper management techniques devised. Lack of functional and the enforcement of any legislation on land management has aggravated on soil erosion.

Legislation well not only check man induced activities leading to erosion, it will also assist in defining the status of different professionals involved in erosion management. In addition, enforcement of legislation is as important as legislation itself. In this regard, when laws are strictly enforced, then soil erosion can be taken seriously.

1.5. OBJECTIVE OF STUDY

During the past few decades' interest in vegetal cover practices was increased substantially. This is reflected in rising concern about deforestation and degradation of the environment. The accompanying decrease in land productivity and farm yield is becoming acceptable.

The role of vegetal cover in maintaining stability in ecosystem has become to the fore front in the search for solution to environment degradation. This study is also directed to this end.

The specific objectives are:

i. To assess the important of vegetal cover in soil erosion control in the study area

ii. To pin point those factors responsible for erosion Hazard in the study area.

1.6 JUSTIFICATION

Ways and manner in which the farmer handles his farm land may lead to low production beyond what is expected, to be achieved, if properly handled by controlling some human factors such as over cropping, excessive farming, clearance of vegetation, deforestation and Bush Burning which may be possible to remove some of the factors that cause soil erosion.

Also the review will serve as source of information to the populace who are interested in farming.

1.7. SCOPE OF STUDY.

The study limited to only five areas within Badeggi and where farm degradation occur partially. The areas are N.C.R.I Chanchaga, TakoNdajiya, TakoGbako, Kpantifu and Edotsu.

1.8. DESCRIPTION OF EROSION.

On can not speak of erosion in general terms. The site and their environment must be accurately described. Rainfall and growing season need to be examined. Erosion varies with the time of year. Some periods are more susceptible than others. As soon as erosion or runoff is observe in a given place, an attempt must be made to trace problem back to itss origin.

The case of sheet erosion is the more or less uniform erosion of the whole surface of a field. The roots of plants, tree and fence posts are increasingly exposed. The top soil are also exposed while in Rill erosion is the accentuation of natural depression caused by surface run-off. While normal cultivation often hides the damage, much fertile soil is still lost.

Gully erosion causes deep fissures in otherwise cultivable land. If left unchecked gullies eat their way progressively back in to the hill.

Stream bank erosion converts deep, fast flowing streams in wide and sluggish meandering watercourse with extensive mud bank. It can cause serious loss of cultivable land.

1.9. STUDY AREA:

Badeggi comprise of four areas in Katcha Local Government area. According to the 1991 census, it is the fist most populous district in the local government of about 23,287 people. Badeggi has an area of 98, 992sq km of which about 68,437sq km [69% of the total area are suitable for agriculture with moderate fertility, drainage and soil conservation measures. It is situated and bounded in the North by Lemu, South by Bida, East by Agaie and West by Lavun.

The land is a gentle slope, which give moderately movement of run off. The soil features of the area has soil which vary from clay loam, loan and sandy soil. The characteristic features of the vegetation are grasses with scattered tress.

1.10. LIMITATION OF THE STUDY.

The research is limited to Badeggi area some parts of farmlands in these areas have been degraded due to human factor. Like over-cropping and excessive farming constructional work clearance of vegetation and deforestation.

The problem of the area is lack of reclamation procedures, loss of soil fertility, diminution of cultivable land, water scarcity and farm crops.

In view of the latter gully erosion has caused a tragedy on the environment as result of road construction, many channel for running water where blocked and water

CHAPTER TWO

2.0 LITERATURE REVIEW

A great deal of research has shown how effective vegetation is in controlling the processes of soil erosion by water. However, tittle regard is given to the important period when vegetation is emerging and establishing on man-made slope. This critical period of low vegetation protection rarely occurs in natural vegetation succession or on agricultural land where mulching of previous crop residuals or cover crop are used.

However, on road construction and urban development sites little emphasis is given to these critical time any yet these environment are extremely susceptible to high rates of erosion in excess [Wolman and Schick, 1967]. This is because of the disturbed and compacted soils, exposed erodible subsoil's, steep slope and lack of vegetation cover. Simulated vegetation in the form of geo textiles can provide immediate erosion protection on such sites and thus prevent both the on-site and off-site consequence of erosion [Morgan and Rickson, 1988].

A study in to the effectiveness of selected geotextiles in modifying surface hydrology and thereby controlling sediment detachment and transport rates of run-off was done. The study is the second stage of an evaluation of selected geotextiles in controlling erosion .the experiments looked at how the different geotextile reduce soil detachment by rain drop impact (splash erosion}, {Rickson. 1988}. Plants influence erosion is all areas except the glacial. For example is influenced by plants both directly e.g tree fall causing mass movement of soil and indirectly e.g through canopy influence on the erosivity of rain fall. Also the removal or change of vegetation can alter erosion rates [Thornes, (1987).

Several attempts have been made to include vegetation in mathematical model of soil erosion [Thrnes, 1985' and Neale, 1987]. The importance of tree fall to erosion was indicated force fully in the Great storm where some 15 million trees were brought down over a large area of southeastern England. A large amount of soil may be disturbed, depending upon the interplay of soil condition (witness, etc), tree characteristic (root network) and the external conditions (wind direction etc) mounds of soil are often produced by tree fall (Hamann, 1984) and these, as well as the pits created, will be subject to subsequent erosion.

Initially, tree fall causes a mass movement of soil, there by directly influencing erosion. Tree falls also exposes soil to further erosion, thus indirectly increasing erosion and potentially influencing soil profile development (Schaetszel, 1986)..

There has been considerable recent work on the role of vegetation in slope stability for example, the reviews of Selby, (1982) and Greenway, (1987).

Vegetation may both encourage and discourage slop instability. For example, de ploy and cruz (1979) illustrate how on steep slopes with shallow soils tree channel may encourage rapid inter flow and land sliding. The stabilizing effect off vegetation may last for several years after clearance corzier, (1986).

In most environment fire leads to an increase in erosion as protective vegetation cover is removed, and chemical and physical changes are made to the soil (chinen, 1987).

Vegetation communities play a range of roles in reducing and occur together and vegetation change will disturb both of these substantial progress has been made in measuring some vegetation effects, but an assessment of the overall situation is more difficult. Ecologists have made particular progress in this field and the frame work of Bormann and likens (1979) has much to offer.

Carter and stone (1989) have studied the indirect effect of vegetation on sand dune erosion processes.

Where plants reduce erosion they often also act to aid sedimentation. Key areas for such sedimentation processes are dunes, swamps and marshes. Vegetation plays two main roles in promoting physical sedimentation, trapping mineral sediments in both root networks and aboveground structures, and producing sediment through the build-up of dead plant material (Eriksson et al 1989).

Recent work has focused on clarifying and quantifying the relationship between deposition and Biological processes. For example, studies have been movements over dunes (Buckley, 1987) Wassson and Nanninga, 1986).

Vegetation cover may be altered radically within a short time, but biophysical changes within the soil which also affect erosion rates may take long periods of time soil under the condition of good plant cover and stable conditions may material, increasing floral and sound activity with possible microprobe formation, undergoing structural improvement with corresponding decrease in bulk density, increase of infiltration capacity and water – transmission capacity and decrease of erosion potentials (Trainable, 1976, 1988).

Borst, Mccall and Bell (1945) studied the effect of crop rotations on soil erosion and runoff in Ohio.

For the condition where land reverts from tillage to forest, Dissmeyen and Fosten (1986,1981) point out that soil reconsolidate particles regain cohesion over a period of six years so that erosion is reduced.

In Luxemborg, Imeson and Jungerius (1974) found that soil under forest cover had more aggregate stability than the soils of nearby areas which had been cultivated for the farmland samples there was resistance to splash erosion.

With regard to infiltration alone, incorporating crop residues in the soil over 10-15 year period reduced run off by almost one-hald.

Walling (1083) stated that when vegetation cover is poor and upland erosion supplies streams with more sediment than they can tarnsport sediment is stored as collurium and allurium. Since storage opportunity generally increases as a power function of basin size, so may storage increase under the above condition.

The establishment of a good vegetative cover on disturbed land may led to downstream sediment yield being augmented from storage. If vegetative cover curtails upland erosion without commensurate decreases of storm runoff then downstream colluvium and alluvium may become unstable and be eroded, maintaining downstream sediment yeild at high levels. This principal sa identified as a potential problem by Happ. Rittenhouse and Dobso (1940) and shown to be operating on regional bases by tremble (19 79,1977).

The influence exerted by vegetation over the intensify and freguency of over land slow production and surface wash erosion in semi-arid areas is well documented (Bryan and Campbell),1986).

Musgrave and Holtan, (1964 have demonstrated that infiltration rates are dramatically improved for soils with a significant humic horizon. Vegetation in reducing effective rainfall intensity at the gorund surface, runoff is less likely to be generated when cover is dense in catchment with cover, these effect may vary seasonally with differing patterns of plants growth and evapotranspiration loss, and also spatially, because of slope angle and aspect effect, Hack and Goodlett, 1960).

A variety of vegetation-based models are available for assessing runoff production outside semi-arid dreas (Gurnell and Gregory, 1987). Of his infiltration theory in particular has been criticized for sites with a locally dense cover [Brayan and Lair, 1982).

In fact, it has been argued [Hallsworth, 1987), that the problems of accelerated soil erosion almost entirely post-date the rise of agriculture, and it is now realized that important organic bonding agents such as the polysaccharide are rapidly decomposed once the soil has been disturbed by plouhing. So that soil strusture is at risk [Greenland, linstorm and Quick, 1962); Tisdall and Oades, 1982).

However, modification of the soil profile extends beyond inversions of the top soil. It has long been recognized that crop productivity can be increased by controlling the soil water regime [Trafford and Oliphant, 1977).

Trimble and Lund (1982) have establihed the relationship of dowstream sediment accumulation to land use in the coon creek basin of wisconsin. They found that, with an increase of poor vegetative cover and management, ther was a strong lag in dowstream rates of sediment accumulation, which was partially a function of the lag in erosion rates and partially the result of up stream sediment accumulation.

The hysteresis effect was enhanced late in the deterioration phase by increased runoff fromovergrazing which increased stormslow and helped transfer sediment downstream, Trible and Hund ,(1982).

The different responses to rainfall, both in the generation of overland and erosion, can be explained by base soil and vegetation characteristic and their condition immediately before, during and after the rainfall events Sevinla, (1988), Dunne, (1978), anderson and Burt, (1978). Because of higher water retention of its thicker regolith and soils theoughout the season, a more regular overland flow response to rainfall and consequent effectiveness in the washing of materials results.

According to Faniran and Ojo, (1980) the history of soil conservation or the reclamation of gullies in south Eastern Nigeria began in 1911, when some forestry officer visited parts of the Udi plateau. During that vivist, the official who led group remarked, "This Plateau erosion(Udi Plateau) offers one of the finest example of hill erosion in the tropics and furnishes a good object lesson of what results are and what is to be expected from unrestricted destruction of forest vegetation.

According to Caldwell (1991) all forms of land degradation lead to a decrease in soil fertility and crop production capacity. In this regard soil due to soil erosin activities occurs across the continent of Africa and other regions of the world (see table 2.1)

Name of Countries	EXTENT OF DEGRADATION					
	Total Degraded Area		Moderate, Severe and Extreme		Light	
	Total million hectare	% Degrade area % vegetal	Total million hectare	%Degraded Area. % Vegetal	Total million hectare	% Degrade Area % vegetal area
Europe	218.9	23.1	158.3	16.7	60.6	6.4
African	494.2	22.1	320.6	14.4	173.6	7.8
Asia	102.9	13.1	6..2	0.8	96.6	12.3
Oceania	102.9	13.1	6.2	0.8:	96.6	12.3
North America x Mexico	62.8	24.8	60.9	24.1	1.9	0.7
South America	243.4	14.0	138.5	8.0	104.8	6.0
World	1964.4	17.0	1215.4	10.5	749.0	65.

Source oldman, Engelen, Engelen and pulles (1990)

For the table 2.1. in absolute terms, the continent of africa among other continents of the world comes second to Asia in terms of total degraded areas but, has a higher proportion of degraded land to vegetated land than Asia. The main source of soil in Luxembourg, Imeson and Jungerius (1979) found that soil under forest cover had more aggregate stability than the soils of near by areas S which had been cultivated for farmland samples there was a good correlation between organic matter and resistance to splash erosion.

With regard to infiltration alone, Wischmei er and manning (1995) found that incorporating crop residues into soil over a 10-15 year period reduced runoff by almost one-half.

Walling (1983) found that when vegetation cover is poor and up land erosion supplies streams with more sediment than they can transport sediment is stored as colluvium and alluvium. Since storage opportunity generally increases as a power function of basin size, so may storage increase under the above condition.

The establishment of a good vegetative cover on disturbed land may lead to downstream sediment yields being augmented from storage. If vegetative cover curtails upland erosion without commensurate decreases of storm runoff then downstream colluvium and alluvium may become unstable and be eroded, maintaining downstream sediment yield at high levels. This principle was identified as a potential problem by Happ. Riffenhouse and Dobson (1940) basis by trimble (1974, 1977).

The influence exerted by vegetation over the intensity and frequency of land slow production and surface wash erosion in semi-arid areas is well documented (Bryan and Campbell,

Musgrave and Holtan, (1964 have demonstrated that infiltration rates are dramatically improved for soils with a significant humic horizon. Because of the additional protective role of vegetation in reducing effective rainfall intensify at the ground surface, runoff is less likely to be generated when cover is dense. In catchment with cover, these effect may vary seasonally with differing patterns of plants growth and evapotranspiration loss, and also spatially, because of slope angle and aspect effect, (Hack and Goodlett, 1960).

A variety of vegetation-based models are available for assessing runoff production outside semi-arid areas (Gurnell and Gregory, 1987).

Horton is still relevant, but the applicability if his infiltration theory in particular has been criticized for sites with a locally dense cover (Brayan and Yair, 1982).

In fact, it has been argued [Hallsworth, 1987), that the problems of accelerated soil erosion almost entirely post-date the rise of agriculture, and it is now realized that important organic boundary agents such as the polysaccharide are rapidly decompossed once the soil has been disturbed by ploughing. So that soil structure is at risk [Greenland, linstorm and Quirk,1962; Tisdall and Oades, 1982.]

However, modification of the soil profile degradation in Africa is the loss of productivity topsoil due to soil erosion. According to Salau(1995), the severity of erosion problems has led to ports of Africa. For example in an assessment by UNEP in 1984, it was found that in the arid semi-arid and sub-humid regions of Africa, some 6,900 million hectares including approximately 80% of the crop land regions have, lost between 25 and 100% of their productive capacity.

In fact, Nigeria's mean annual loss through erosion is estimated to be about 25 million tonnes. A. shelterbelt is a wind barrier of living tress and shrubs maintained in order to protect farm fields from adverse effect of wind-speed like wind erosion and moisture loss. A windbreak is defined as a wing barrier more specifically used for the protection of farms and the environment in generally.

The term shelter belt, refers to all types of living wind barriers whose main objectives is to reduce wind-speed, resulting in the protection of Agriculture lands people, animals and infrastructure.

Shetrbelts are a common feature in arid and semi-arid areas. Big systems of shelterbelts can be found in the USA, the former USSR, China and Australia.

In tropical countries, the knowledge of shelterbelt establishment and management is growing. During the last secennia shelterbelt studies have been carried out in several tropical countries including Niger, Nigeria, India, Burkina. These have lead to an increasing use of shelterbelts in thise countries.

The best result from shelterbelt can be seen in areas where higher wind-speed are present where there are prevailing winds for long periods, where the soil is dry for many months and loose structured soils occur.

Early basin studies produced conclusive data on the influence of forest on runoff and sediment load of river [Bales and Henry, 1982). Subsequently other studies have considered the variation of sediment load with respect to vegetation and land use management changes.

In addition, rapid removal of vegetation by deforestation or fire has been used to emphasis the protective role of vegetation covers. (Imeson, 1971 and Saplaco, 1983). Although the results of deforestation tend to produce the most extreme dediment yields, the effect of land use management changes are far more relevant to a much wider area. In cultivated areas, soil compaction from farm machinery has an important influence on infiltration, increased surface runoff and hence soil erosion [fullen, 1985, chernysher, 1972]. Similarly compaction can also occur in densely stocked grassland areas as a result of poaching which reduce infiltration, especially during the wet season.

In a study of range land in Colorado, lusby (1970), sound that runoff and sediment yield from ungrazed catchment were 30 percent and 45 percent less respectively than from grazed catchments. In addition, poaching by cattle in the vicinity of stream channels was found to be a significant source of available suspended sediment in the farlow carchment [Mitchell, 1972]

Although it is widely accepted that vegetation cover is a significant factor in the erosion and sediment yield of drainage basins, numerical parameters have been poorly developed, especially for larger catchments.

Detailed vegetation and land use variable are used in mathematical models for predicting sediment yield in plot studies and small catchment surveys. But the application of vegetal factors in the analysis of larger catchment becomes exceedingly vague and generalized. The use of vegetation and land use factors in empirical equation for the prediction of sediment yield have been dominated by the cropping management factor, and the conservation practice factor from the universal soil loss equation.

An extension from plot studies to small catchment seems a reasonable progression but the application of the above techniques to larger catchments becomes more difficult.

The application of these two parameters from USLE to drainage basin the united kingdom does not seem very practicable data from plot studies of contrasting crop types and management techniques. Therefore, some other methods may be more appropriate. Examining the concept of competition between erosion and vegetation growth, Torne

(1985) reviewed the contemporary approaches to modeling. He worked on the idea of ecological modes to evaluate the existing complex relationships.

Vegetation and land use changes within the Wye catchment have been extremely important factors in determining the variation of erosion during the Helocene as shown by rates of sedimentation [chamber, 1985 and Bartley, 1960.]

An examination of contemporary effects of vegetation cover on sediment yield cannot easily be used to reconstruct influences of earlier climatic change but they are of greater use in estimating the influence of man's impact on the basin sediment system. Example of present land use changes and land management can be used to suggest possible effects of changes in the vegetal cover, but it is important to consider that technological changes in equipment and techniques can present unrepresentative results.

The progressive decline in forest cover from more than 90 percent during the Atlantic period to less than 10 percent at present has been instrumental in the erosion history because of the influence of trees on the water balance of the catchment and the protective role of the canopy cover and root system. Re-afforestation and more recently monitored de-forestation of extensive areas in central Wales have provided a unique opportunity to assess the relative effect of tree and grass land on water yield and catchment erosion.

As a consequence of afforestation, erosion of suspended sediments and bedload on the upper servern is greater than in the upper Wye, (Newson,1979, 1980 and 1985).

Vegetation communities are not static and change to vegetation [especially caused by human interference] often lead to spectacular changes in erosion rates. Heede (1987) however found that erosion only increased marked in harvested forest areas in Arizona.

3:3:2. THE SECONDARY DATA

In secondary data were scored from textbook, thesis, journals, seminar paper, newspaper report and other published and unpublished material on the use of vegetal cover in soil erosion control.

3:3:3 RECONNAISANCY SURVEY

An extensive personal observation was under taken with a view to making inventory of existing condition and assembling of back ground data of the sampling area in Badeggi. These include the assessment of gully erosion sites, which affect the farming activities around the site.

3:3:4 INTERVIEW

Interviews were conducted with the people of Badeggi area directly involved in the management of our environment. The people interviewed were staff of the National Cereal Research Institute Chanchager Badeggi (N.C.R.I.) concerned with environment problem. Others are staff of govt. Day Secondary School Badegge environmental Club, village heads and many others.

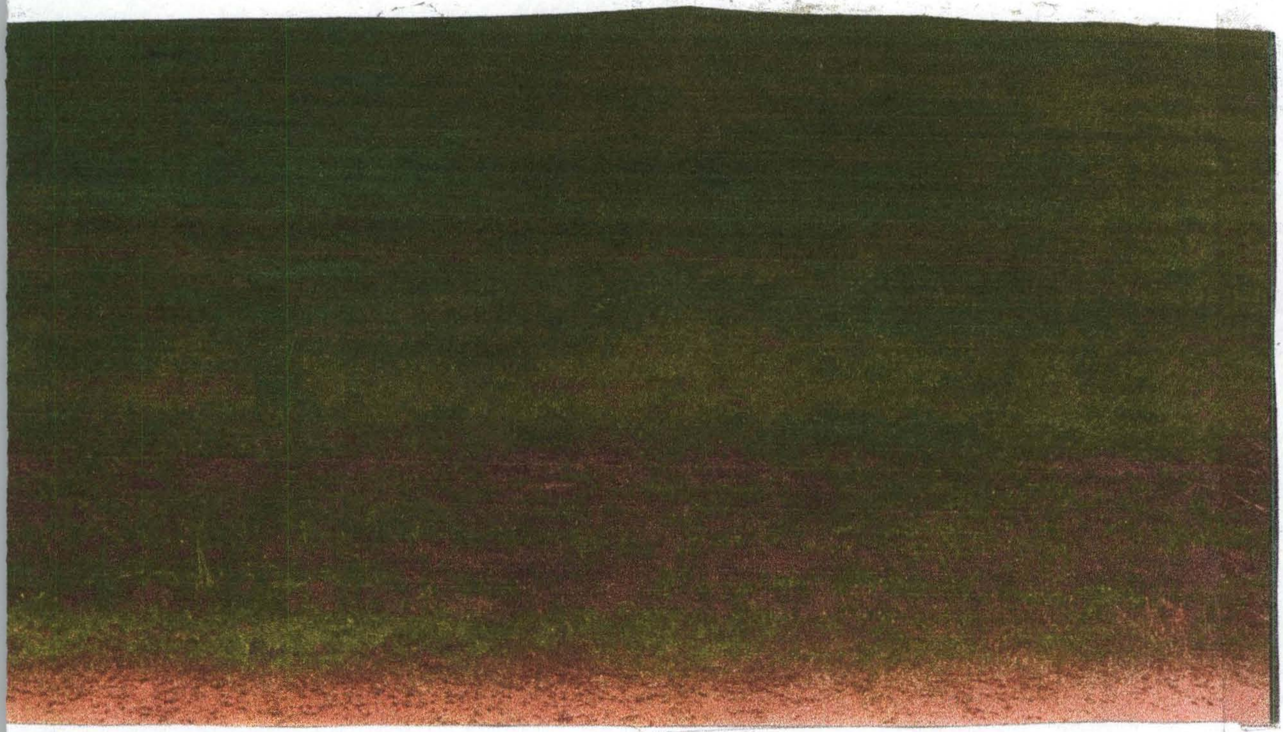
The people interviewed were carefully chosen in stratified form to ensure a reliability of information received. During the reconnaissance survey people found cutting down the tree were also dialogued with such people were adult.

CHAPTER FOUR.

4.0 DATA ANALYSIS AND PRESENTATION

This study is concerned with the study of use of vegetal cover in soil erosion control problems and prospect with Badeggi as the case study.

These chapters deal with results, analysis and discussion of findings. The photographs were taken in different areas of Badeggi.



Photograph 1 is taken in National Research Institute Badeggi (N.C.R.I.} chanchaga in Badeggi with a well develop protected ground cover which allows the infiltration of water easily and it reduces the run off.

Erosion first appears in the form of splash, which lead to the formation of hard, implemeable soil layer. If the ground is protected by any kind of cover, this reduce the impact of the rain drops and the water reaching the ground surface no longer has the force to sort the soil parts when the kinetic energy of rainfall dissipated by the material covering the ground, the dropping water loses its erosive force. When no beating crust is formed on the soil, infiltration can still take place.

If the land is flattened with little vegetation cover the run-off may occur and maximum infiltration may take place even where there plant cover. There may be little splash and runoff in the area of the study.

Cover sowing can sometime reduce the intensify of soil erosion during the early stage of the rainy season. Even though the plant may be seasoned and unable to withstand the dry season. It will leave protective mulch on the ground. Mulching protect the soil from the effect of splash and preserves soil porosity and infiltration capacity.

Photographs II is taken in Tako Ndagijiya area of Badeggi which shows the place with thick forest, tree and which protects the soil from the impact of rain drop directly on soil. It reduces the soil temperature and act as wind break, reduce the soil erosion.

Tree can play an important role in erosion control especially in hilly areas. Treas. Trees help prevent shallow landslides on slope. Tree can be planted in row following the contour lines. These roes should contain abundant undergrowth and litter. Eroded materials from higher well accumulate in the rows eventually leading to the formation of natural terraces.

Trees in plants association is also an efficient ways of checking the beating action of tornadoes at the on set of the rainy season. Trees like herbaceous plant are able to provide a great deal of cover, which depends directly on the density of their foliage at every stage of the rainy season. The mango tree keeps its leaves all the year round amply protecting the soil from the rain but creating dense shade, which prevent plant from thriving underneath. It improves the soil structure and encourages infiltration.

In the case of every fall tress the impact of large raindrops falling from their crown can be considerable. The advantage of tall tree as regard protection from hard crust lies more in the litter they deposit than indirect soil protection from beating rain drops.

Every tree inter planted with seasonal crops can be looked at to see how it helps to control erosion and encourage infiltration.

Photograph III is taken in TakoGbako area of Badeggi where there is over cropping and other farming activities like deforestation and Bush Burning which leaves the land Bare ground without cover which give way to erosion.

The way in which the farmer or the cattle owner treat his fields during the year has and important impact on erosion and some practices cause fearful erosion damages. Bush burning every year at the same period when plant residue is at there driest and the heat is intense the chances of soil erosion are high at the on-set of the rainy season.

Bare ground beaten by ran fall especially where there is impermeable rock, the hard rock impedes infiltration. About 90 percent of the rainwater run off towards the stream leading the soil erosion. In other words, this can lead to rill erosion, which is the accentuation of natural depression caused by surface run off. Although normal cultivation often hides the damage done, but much fertile soil is still lost. On the soil cultivable land if left unchecked gullies eat their way progressively back in to the hill.

Photograph IV. is taken in Kpantifu area of Badeggi where the land is bare ground of cover which allows easy run-off of water leading to flooding and gully erosion

4.1. EROSION AND RUNN OFF: A SERIOUS ECONOMIC PROBLEM.

Slash, run off and erosion are ecological problem consequently leading to economic problems. Erosion causes huge economic losses, which manifest themselves on several levels, loss of cultivable land as a result of Run off.

Soil nutrient is lost for cropping when the soil is clogged crushed over land surface as a result of the run off. Crops such as maize require about 600 millimeters of rain for growth but as a result of the run off, only between 150mm to 200mm is absorbed by soil, which may inevitable leads to poor yield

LOSS OF FERTILITY: This also affect production and yield. When chemical or organic fertilizer is applied and the land is subjected to run off the fertilizer is also carried away to the gullies and this again lead a consideration economic loss. In the same way farmer often fin it impossible to level gullied area, given the high cost of the operation. A part from the losses due to the removal of mineral arable land is lost and large areas may be affected. Flooding of valley bottoms and silting of lakes. As run off worsen on the slope it caused devastation in the valley both in the field and on the infrastructure. After heavy rain, any destroyed Garden in a near by valley are usually covered with a 30 to 50 centimeter layer of silt and clay. Destruction is some time on a vast scale and some areas are completely flooding after excessive rainfall. The formation of a crusted soil layer just after sowing may hamper or even stop seeds emerging. This in turn leads to productivity and production losses.

4:2 HUMAN, ORIGIN OF ERSION.

The economic problem linked to run off and erosion can be attributes to human behaviour. For instance, the excessive felling of trees inappropriate farming practices. The absence or inadequacy of land development or land use system.

Wanton fires.

The abandoning of pastoral custom and consequent overgrazing. All these can bring about excessive run off leading to soil erosion as it relates to human behaviour in the area of study. All farmers the authorities facing problem of erosion should take a close look at every aspect of human responsibility.

Lack of functional and the enforcement of any legislation on land management has aggravated both soil erosion and the politics introduced in to it, legislation will check man-induced activities leading to erosion. It will also assist in defining the status of different professionals involved in erosion management. In addition enforcement of legislation is as important as registration itself. In this regard, when laws strictly enforced then politics on soil erosion can be disregarded. Erosion control measure range from channelization which encourage the growth of short cover on all surfaces to planting of trees as wind breaker as well as environmental education with emphasis on the manner of man environment interaction among others.

CHAPTER FIVE.

5.0. SUMMARY AND RECOMMENDATIONS.

5.1. SUMMARY OF FINDING

as from the study and analysis of data collected it show that a number of factor usually determine the importance of vegetal cover to soil erosion control. The study of Bush Burning, deforestation, over-cropping, over grazing and excessive farming on soil erosion. From the study it show that area with bare land are TakoGbako due to the excessive farming and other activities of man.

About 50 percent of the area of National Cereal Research Institute [N.C.R.I.] Chanchager in Badeggi are well protected with the ground cover which reduce the run off allows good infiltration.

About 30% percent of the Tako Ndajiya is thick forest which reduce the splash of rainfall in the soil and also reduce the soil temperature as well as checking the effect of soil erosion.

5.2. RECOMMENDATIONS AND CONCLUSION..

Erosion control is not a matter of only one method. It should involve multiple dimensional approach. The farmer should be enlightened on the need for proper erosion control.

Where erosion and water management are concerned the whole cropping system must be studied. The farmer mentality must be anti-erosive and this technical skill must not leave any chinks, which would open the door to erosion. The farmers should bear in mind that, particular land of farming practice which is beneficial on a particular site may not suit another one. Heavy, compact soil does not reach like sandy, free draining ones.

Crop association right for one area are not necessary so else where in some place, it is possible to mechanize field work in other. It is more difficult. Where such problem occur, the farmer should lay emphases on cultivation of covering crops example leguminous crops, soil depth desired crop, rainfall, maintenance of plot, relief, financial resource available labour, opportunities for combining farming and livestock are all factors which have to be taken in to account when choosing an anti erosive cropping system and its related practices.

Protecting land and managing its water reserves is a problem associated with the exploitation of farm and settlement as a whole people must understand the comprehensive nature of problem and realize that farming practices and land improvement are complementary. Their diversity leads to the conservation and improvement of law assets. Land development combing mechanical and biological method. Preservation method in farming improvement of natural soil fertility and structure.

Bush burning practices should be evaluated and if burning can not avoided, it follows these roles.

- Burn as little as possible.
- Burn before plants and plant litter are too dry.
- Burn with, not against the wind to speed up the passage of the fire.
- Burning against the wind always burn more deeply and more devastating and heat the ground more. So the farmer must know how to demarcate the area he intends burning.
- Only burn the land area trickily needed.

Farmer should practice inter-cropping which is an efficient way of providing plant cover on tilled land.

Maize and Bean should be sown in the plot. After three to floor week 90 percent of the soil surface enjoyed protective plant cover and would no longer suffer from rain splash.

The choice of plant association is important because some species protect against hard crust better than others for example the protection given by millet, maize, cotton and bean leaves. The number of leaves, their shapes, rigidity and distribution are all factors affecting their covering capacity.

The government should come out with a definite policy on environment conservation. There is need for more research in soil conservation and awareness.

The government to set up an independent body saddled with the responsibility of erosion monitoring and control.

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