Journal of Sustainable Development in Africa (Volume 12, No.1, 2010)

ISSN: 1520-5509

Clarion University of Pennsylvania, Clarion, Pennsylvania

EROSION PROBLEMS IN A NIGERIAN RURAL COMMUNITY

By: Ajewole Davies Ojo & Oni Johnson

ABSTRACT

This work is an assessment of the impact of soil erosion on landscape degradation in Koro – Ekiti, Kwara State, Nigeria. The primary objective of the work is as follows; investigation of the nature of erosion problems, assessment of erosion influence on agricultural practices and responses to erosion management in the study area. To achieve the stated objectives, data were generated through questionnaire administration and direct field measurement of the width and depth dimension of the selected erosion sites, also descriptive statistical techniques were employed in the analysis of data generated. The analysis revealed some interesting features as follows: there exist a relationship between settlement structure and erosion in the study area; (ii) considerable loss in soil status led to decrease in agricultural productivity, (iii) gully erosion is prominent on both road networks and farmlands in the study area. Various measures suggested to curb the menace of soil erosion were as follows; design and construction of drainage channels to prevent soil loss to surface runoff, massive afforestation, proper housing layout, environmental education programmes among others.

Keywords: Nigerian Rural Community, Erosion problems, drainage channels, road networks

INTRODUCTION

The biospheric layers of the earth constitute the layer where the activities of both micro and macro organisms take place (Jimoh, 1999). It is on this layer that the activities of man in his environment take place. These activities undertaken by man include mining, quarrying, agriculture, constructions, lumbering, among others (Geller, 1982; Jeje, 1982). In all these

activities, man gives little attention to their implications on the environment, such as soil erosion (Howard and Remson, 1978; Kowal and Kassan, 1988; Hindson, 1983).

Soil erosion is a dynamic geomorphic event operating on the landscape. It is defined as the process leading to the general degradation of the ground surfaces (Knapp, 1979; Morgan, 1980; Blum, 1985). Similarly, Faniran and Areola (1980) defined soil erosion as a situation in which soil is removed at a rate faster than that at which new soil is formed. Jimoh, 1994 defined soil erosion as the removal of soil materials and/or soil nutrients by surface run-off from different points of origin to other locations.

The earth's landforms are closely inter-related and some of the observation which has been made with the passing of time shows that these landforms are acted upon by the processes of erosion causing the landforms to undergo a progressive change from initial forms sequentially to ultimate forms (Sparks, 1995).

This geomorphic event may degenerate into sheet, rill or gully types of erosion (Cooke and Doornkamp, 1974; Jimoh, 1994). Sheet erosion is essentially a process that involves the uniform removal of soil surfaces, which is when the soil surface is undergoing a uniform degradation. Rills are parallel grooves of little depth covering the land surface which can easily be filled through normal cultivation; formation of rills is one of the consequences of flow water. Sheet and rill erosion are the fore runners of gully erosion representing the incipient stage of the development of gully erosion (Oyegun, 1980; Bergsma, 1981).

Gully erosion is any erosional channel that is so deep that it cannot be crossed by a wheeled vehicle or eliminated by ploughing, unlike rills which can easily be filled through normal cultivation (Dictionary of Geologic terms).

The major agents of soil erosion in the tropics includes rainfall, while some of the attributes of rainfall are; intensity, duration, drop-size, amount and frequency. other factors that contribute to the occurrence of soil erosion in the tropics includes soil type and its characteristics,

topography, geology, cultural practice carried out in the region and conservative practice applied to the land (Faniran and Jeje, 1983).

However, it is the combined effect of these factors of soil erosion that makes its operation and consequences hazardous and therefore of great relevance to man (Dent and Young, 1981). A case in point is the fact that soil erosion has considerably initiated landscape destructions (Jimoh, 1994; Jimoh, 2003; Jimoh and Ajibade, 1995).

Gullies are formed as a result of a combination of climatic and human influences. For instance, over-cultivation of land in certain parts of Kwara State has resulted in gully erosion and such arrears include the road linking Iloffa with Odo-Owa in Oke-Ero Local Government Area of Kwara State, and most farmlands in Ekiti Local Government such as Osi, Araromi-Opin and other neighboring villages.

In view of these occurrences, this research endeavor focuses on feeling the pulse in individuals on erosion problems and the possible responses to such menace.

AIM AND OBJECTIVES OF THE STUDY

The primary aim of this work is on the impact of erosion on landscape degradation. To accomplish this philosophy, the following objectives are being pursued as follows;

- To investigate the factor of erosion problems
- To assess the effects of erosion on agricultural practices in the study area
- To study the anthropogenic activities in the study area
- To examine the nature of erosion in the study area
- To assess the responses to erosion management in the study area.

LOCATION OF THE STUDY AREA

The study area is Koro town, located in the Ekiti Local Government Area of Kwara State. It lies as the boundary between Kwara and Kogi States. Koro is located on latitude 8^0 02N and longitude 4^0 07E in the South-Eastern part of Kwara State and situated within the geographical entity of Western Nigeria.

CLIMATE

The climate of the study area is basically monsoonal in character and is consequently expressed as a contrast between a dry and a wet season. These two regimes of the climate are very dependent on the two prevailing air masses blowing over the country at different times of the year-the dry North-Easterly air mass of Sahara origin and the humid maritime air mass blowing over the Atlantic.

The two air masses blowing from nearly opposite directions meet at a zone of discontinuity stretching East-West Africa, and variously called the inter tropical front (ITF), the inter tropical convergence zone (ITCZ), the surface discontinuity and the inter-tropical discontinuity (ITD). Whenever two air masses meet, convectional rain usually follows.

The mean annual rainfall is about 1168mm; it exhibits the double maxima pattern. There are two rainfall periods: April/May and September/October, with the month of August as the break period. Dry season begins in the month of November lasting till the month of February. December and January are usually cold and dry due to the influence of harmattan wind from the desert region of the North. The early rains of February and April, which come just after the end of dry season, are very effective in the process of soil erosion.

The low relative characteristics of the dry season leave the surface of the soil dry and cracked at various points. These “fractures” are rapidly exploited by the runoff of storms of the “early rains” and greatly favour the inception and subsequent evolution of gullies.

GEOLOGY

The geology of Koro-Ekiti is characterized with basement complex which are the combination of igneous and metamorphic rock which are found below the surface but allows substantial percolation of rain water. Therefore, because of the nature of the geology if these environments, more of surface water are found such as overflow and which influences the intensity of erosional effect of this environment.

Geomorphologically, in terms of landscape and the configuration of this environment, the relief of this part of the environment is classified as Inselbergs because it is located in humid tropical environment and the topography of this environment is hilly.

SOIL OF THE STUDY AREA

The environment of Koro is characterized with ferallitic soil, the rate of biological turn-over in this environment is high, and decomposition is higher because of adequate rainfall. Soil erosion is a major problem in this environment.

However, because of the nature of climate, vegetation and bio-climate of this environment, chemical weathering is mostly significant due to the high temperature, which speeds-up the rate of chemical reaction in rocks. The end product of chemical weathering in this environment is clay. This is because erosion has washed away the top soil, leaving behind the clay soil.

TOPOGRAPHY AND DRAINAGE PATTERN

Koro settlement is an area of highlands. The general land surface is of a basement complex rock that displays a number of Inselbergs, structural hills and ridges, which are remnants of the 'African' denudational surface. The Inselbergs are bare domes whale backs or less regular hills and display exfoliated capping and boulders. The major rivers draining Koro community are river Iye and Agbaramoko that flow southward to River Niger. The geology of this area influences the drainage system of this environment (Ayeni, 1978).

Therefore because of the nature of the geology of this environment, more of surface water is found as overflow which influences the intensity of erosional event in this area.

Fig. 1. Map of the Study Area

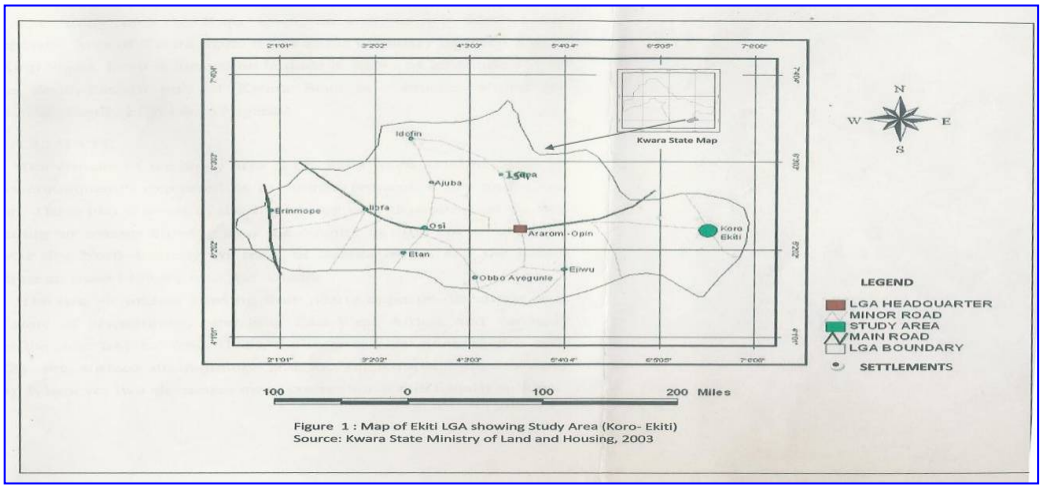

Figure 1 : Map of Ekiti LGA showing Study Area (Koro- Ekiti)
Source: Kwara State Ministry of Land and Housing, 2003

EROSION PROBLEMS IN KORO

TABLE 1: KORO NORTH

S/n	**Location**	**Land use type**	**Depth (m)**	**Width (m)**
1	ECWA dispensary	Foundation of house	0.70	0.96
2	Water works site	Farmland	1.60	1.00
3	Koro-Eruku road	Road network	1.15	1.50
4	Akola road	Road network	1.30	1.22
Total			4.75	4.68
Mean			1.18	1.17

Source: Author's Fieldwork, 2009

TABLE 2: KORO SOUTH

s/n	**Location**	**Land use type**	**Depth (m)**	**Width (m)**
1	Teachers' staff Quarters	Road network	1.20	1.00
2	Koro Grammar School	Farmland	1.48	3.11
3	Police station	Road network	1.15	1.00
Total			3.83	5.10
Mean			1.28	1.70

Source: Author's Fieldwork, 2009.

TABLE 3: KORO WEST

s/n	Location	land use type	Depth (m)	Width (m)
1	Oketari road	Road network	1.65	2.20
2	Koro-Egbe road	Road network	2.81	2.15
3	Cemetery	Road network	3.00	2.11
Total			7.46	6.46
Mean			2.49	2.15

Source: Author's Fieldwork, 2009

TABLE 4: KORO CENTRAL

s/n	Location	Land use type	Depth (m)	Width (m)
1	CAC road	Road network	1.01	0.99
2	Post Office	Foundation of House	1.20	0.98
3	Corpers' lodge	Road network	1.12	1.05
Total			3.36	3.02
Mean			1.11	1.01

Source: Author's Fieldwork, 2009

Erosion is the study area is best studied and understood in the four major zonal parts of the study area, i.e North, South, West, and Central. This division is informed by the variations in the intensity and rate of occurrence in the study area. Furthermore, in the Northern part of Koro, the mean depth of erosion is 1.18m and the mean width is 1.17m (see Table 5).

Fig. 2. Gully Erosion site in the Study Area.

Plate 1: An open space severely affected by gully erosion along Koro grammar School.

Fig. 3. Road network Erosion site in the study area

Plate 2: Road network that is almost washed-off by water erosion along the ECWA dispensary road, Koro. The width of the road has become so reduced that is almost impassable for four wheeled vehicles.

Fig. 4. Erosion site in the study area

Plate 3: Erosion has completely ravaged the unpaved drainage system along Mount Tarf road, Koro .

TABLE 5: SUMMARY OF EROSION RATES IN KORO

Cardinal direction	**Depth (m)**	**Width (m)**
North	1.18	1.17
South	1.28	1.70
West	2.48	2.15
Central	1.11	1.01

Source: Author‘s Fieldwork, 2009

In the table above, is can be observed that the mean depth of erosion in the Southern part of Koro is 128m, with a mean width of 1.70m. The Western part of Koro is observed to have a mean depth of erosion of 2.48m and a mean width of 2.15m. The central part of Koro has a mean depth of erosion of 1.11m, while the mean width of erosion there is 1.01m.

Generally, erosion problem is most severe in Western part of Koro, while the South, North, and Central follow respectively in the area.

SAMPLING FRAMEWORK

The reconnaissance survey of the study area assisted in the identification and accurate delimitation of the study area. Essentially, the survey was done in order to collect proper data on the extent and nature of erosion in occurrence. Also, many residents were interviewed to ascertain the direct effect of soil erosion and management practices in the area.

Data collection was based on the administration of questionnaires. The study area was divided into four parts/zones. The divisions are Koro North, South, West and Central. These zones were sampled using Random sampling method. In a preliminary field reconnaissance survey, detailed plans of gully network in the districts were produced. Each gully network within a zone was divided into various parts for the purpose of field measurement. During each measurement, the gully number, depth and width were measured and recorded.

Fifty questionnaires were administered due to the fact that the area has relatively low population; the responses were later analyzed employing descriptive statistical technique and tabulation method. The first part consist of questions on personal data, the second part consist of questions on socio economic problems, while the third part deals with responses to erosion problems.

SUMMARY OF FINDING

The analysis of the data collected revealed a number of interesting features about the impact of erosion on the study area as follows:

a. The problem of soil erosion is most prominent in the central part of the study area. This may be due to the fact that most human-based activities take place there.
b. Gully erosion is the most prominent in Koro Town (study area).
c. Erosion problems are most pronounced on both the road networks and farmlands.

RECOMMENDATION AND CONCLUSIONS

Erosion menace is one phenomenon to which the adage, “A stitch in time saves nine” is most applicable. A number of the severe and devastating gullies would not have resulted had they been attended to at their incipient stages.

It is against this background and based on the findings of this study that the following recommendations have been made as follows:

Firstly, an integrated catchment drainage system is lacking in the study area and this can be controlled. The control is surface run off and maintenance of stable soil slopes in gullies involves engineering schemes. In controlling storm water runoff, drainage channels have to be designed and constructed so as to prevent the gnawing away of soil by the runoff, especially at high velocities in narrow earth ravines. The sediments carried by the run off may also be extracted by the construction of filter check dams, to progressively reclaim an existing gully.

Secondly, considering the nature of the topography of Koro Town, it is noteworthy to say that Koro can best be developed through a comprehensive contour planning of the layout of land use. Consequently, buildings should be built along terrace rather than in the haphazard pattern they were done in the area.

Thirdly, most of the human activities observed during the study portrayed lack of awareness by the generality of the populace, of the nature and action of erosion as well as of the consequence of their activities. Thus, a general awareness programme is necessary to enlighten and sensitize the populace.

Fourthly, in conserving the vegetation cover, this required a biostructural scheme. Intercepting of rock falls may be accomplished with a biostructural scheme or with an engineering structure, but the biostructural schemes are more economical than engineering structures.

Fifthly, in view of the contribution of road construction to increase erosion problem in Nigeria, it is recommended that the Federal, State and Local Government should provide adequate

drainage system along all the roads and ensure adequate maintenance of these road network systems.

Finally, the impact of soil erosion on the affected area should be thoroughly assessed, with a view to finding appropriate management techniques.

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