

INVENTORY OF SOME GULLY EROSION SITES IN CENTRAL CROSS RIVER STATE, SOUTHEASTERN NIGERIA.

E. E. OKU, A. N. ESSOKA, G. ITA, P. A. ESSOKA

(Received 10 October 2003 ; Revision 10 August 2004 accepted)

ABSTRACT

The research on inventory of some gully erosion sites in central Cross River State, Southeastern Nigeria was carried out in 2002. The objectives of the research were to identify spectacular gullies in the area (Yakkur, Obubra and Ikom Local Government Areas); determine the dimensions, causes and the land use affected.

Gullies identified in Yakurr were located at Njerekoko, Ugbekuma, Ajere and Lekpankom. In Obubra area they were at Ofukpa and Etapeh, while in Ikom they were located at Water Board road, Cameroon street and Abakpa. The gullies identified were caused by run off, uncontrolled overland flow, steep slope and faulty construction. Main land use affected were settlement/residential buildings.

KEY WORDS: Gully erosion, uncontrolled run off, rain forest zone, land use, overland flow.

INTRODUCTION

Man depends to a large extent on the soils of the world. Soils also are natural bodies on which plants grow. Soils underlie the foundation of houses and factories. They are also used for roads, highways, airports, seaports and soils to some extent influence the life span of these structures. Soils are used to absorb domestic waste from septic sewage systems. These therefore, suggest that soils are of great importance to man and his society.

Degradation of the soil, particularly in rain forest zone of Nigeria is mainly manifested as soil erosion. The consequence of soil erosion in the rainforest zone of Nigeria is the spectacular gullies. Famesco (1992) stated that four eastern states of Nigeria, Anambra, Imo, Akwa Ibom and Cross river accounted for over 74% of the total 1,329 gullies identified and documented in Nigeria. Recent observations show that the number has increased and history reveals that soil degradation has been associated with downfall of some civilization which good soil had helped to build. Famesco (1989) attributed striking high rate of erosion in the rainforest zone of Nigeria to factors such as geology, climate and high population density. Chijioko (1992) reported that areas prone to severe gully erosion threat are the areas of unconsolidated sediments of quaternary coastal plain sands and weakly consolidated sediments of the tertiary to cretaceous liquate formation.

These erosion sites are grossly manifest in areas of Anambra, Imo, Edo, Abia, Akwa Ibom, Cross River and Enugu States where regular slopes of 2.5% or more exist. Evidently erosion in the forested rainfall belt on the west coast of Africa is a function of deforestation. The predominant soils of South Eastern Nigeria are Ultisols and Alfisols. According to Armon (1986) of these, Alfisol cover about 10% of the land area and Ultisols, 90%.

Under natural vegetation, these soils are characterized by low bulk densities, high-saturated hydraulic conductivities, low run-off and little or on erosion. With the removal of vegetation and exposure to raindrop impact, these soils slake readily and develop an impermeable crust resulting in high bulk densities, low saturated hydraulic conductivities and low infiltration rate. Consequently surface runoff is high and erosion becomes a serious problem. From predicted erodibility values for Cross River State soils, the problem of erosion should not have developed were soil erodibility the only factor controlling erosion. Rainfall intensities, a major factor for the humid tropical zone of Nigeria are generally high (Aina et al, 1977, Obi, 1980; Armon, 1984). For instance,

intensities for five minutes duration are as high as 225 mmhr⁻¹ for Ikom. The value is higher when compared to 15mmhr⁻¹ for heavy rain, 41 mmhr⁻¹ for excessive rain observed in temperate region.

Man occupies a central position in the use or misuse of land as a resource base either for agriculture, urbanization, infrastructure development or mining. Chijioko (1992) reported that man in his insatiable desire has created a terrible ecological imbalance by deforesting the area for one reason or another. Armon (1986) reported that footpaths to farms, springs and markets also accelerate soil erosion. Also defective compound development and construction led to the development of many gullies in the humid region. Soil erosion has severe consequence on human lives and properties. Famesco (1992) reported that 80% of the documented erosion sites are classified as very active and it is estimated that over 850,000 hectares of land in Nigeria are badly affected annually by erosion. Over 700,000 hectares of the Nigeria Delta land has been devastated by coastal erosion (Fubera, 1987; Elumoye, 1991). Information on gully erosion in South Eastern Nigeria is mainly on the coastal lands found in the south. The objective of this research is to highlight the extent of gully erosion menace in central Cross River State, Southeastern Nigeria.

STUDY AREA

The study area is located in central Cross River State, Southeastern Nigeria. Cross River State is situated between latitude 4°45'N and 6°45'N; and longitudes 7°45' and 9°00' E. The state is bounded in the North by Benue, West by Ebonyi and Abia; South West by Akwa Ibom State; South by the Atlantic Ocean and by the Cameroon Republic in the East. The three local government areas studied were Yakurr, Obubra and Ikom.

The study area has humid tropical climate. The rainy season starts from April while the dry season from October each year. The rainfall pattern is bimodal with peaks in June and September. The main annual rainfall ranges from 2500 – 3000mm in Ikom while in Obubra and Yakurr is between 2000 – 2250mm (CRADP, 1992). The study areas are within the lowland rainforest zone in the tropical rainforest belt of Nigeria (Keay, 1959). Though the vegetation is primarily rainforest, bush regrowth and crop farm predominate.

FIELD STUDY: Locating and documenting gully erosion sites in Yakurr, Obubra, and Ikom Local Government Areas of South Eastern Nigeria was first conducted by preliminary studies. In addition during these visits capturing of the gully eroded sites with still camera was done. Cross River Task

E. E. OKU, Cross River University of Technology, Calabar, Nigeria.

A. N. ESSOKA, Cross River University of Technology, Calabar, Nigeria.

G. ITA, Cross River University of Technology, Calabar, Nigeria.

P. A. ESSOKA, Dept. of Geography, Ahmadu Bello University, Zaria, Nigeria.

Force on Erosion Control (1987) had earlier reported few of the sites visited although at the time of this visit the gullies have now enlarged to become frightening and very active.

MEASUREMENT/EQUIPMENT USED: Still camera was used in snapping the sites. Measuring tape was used to measure the dimensions and machetes used in clearing roads/tracks to sites while a ladder was used in going down and coming out of the gullies.

RESULTS

YAKURR LOCAL GOVERNMENT AREA

- (i) **NGELEKOKO:** The gully was located in the western part of Ugep town along the Ugep-Ediba Federal Road. Some engineering work had been carried out in an attempt to control the gully but a greater area remained unstabilized. The gully is 300m long, 10m wide and 3m deep. The gully is caused by run-off and land use affected was the highway.
- (ii) **UGBEKUMA:** This is in western Ekor. It measured 1500m long, 3m wide and 6m deep. Causative agent was run-off and very steep slope. Land use affected was settlement and residential building.
- (iii) **AJERE:** This is found between Ajere and Ekpety with the dimension of 500m long, 5m wide and 2m deep. It is caused by run-off. The gully was very active even though some engineering works had been done in order to control it but to no avail.
- (iv) **LEKPAKOM:** Located in eastern part of Ekor town, it has the dimensions of 1800m long, 7m wide and 4m deep. Efforts made to control the gully by constructing some drainage and embankment had failed. Causative agent was identified to be run-off and land use affected was settlement, residential building and the highway.

OBUBRA LOCAL GOVERNMENT AREA

- (i) **ETAPEH:** This gully has a length of 1000m, width of 6m and depth of 3m. The main cause was run-off. Land use affected was settlement/residential buildings and the highway.
- (ii) **OFUKPA:** Located at the northern part of Obubra town, the dimensions are length 1200m, width 5m, and depth 3m. The cause of the gully was over land flow.

IKOM LOCAL GOVERNMENT AREA

- (i) **CAMEROON STREET:** This gully measured 800m long, 4m wide and 2m deep. It is caused by run-off and uncontrolled overland flow. Land use affected was settlement and residential buildings.
- (ii) **ABAKPA:** Found in the heart of Ikom town, it has the dimension of 500m long, 6.5m wide and 5m deep. Cause of the hazard was run-off and uncontrolled overland flow. Land use affected was settlement / residential buildings.
- (iii) **WATER BOARD ROAD:** The gully has the dimensions of length 800m, width 3m and depth 1m. It was caused by the excavation for laying water pipes and aggravated by run-off and slope. Land use affected included the highway.

DISCUSSION

Table 1 shows the number of gullies surveyed in Yakurr, Obubra and Ikom Local Government Areas of central Cross River State of Southeastern Nigeria. The striking high rate of erosion in this location has been ascribed to factors such as soil (Chijioke, 1992; Armon, 1986; Osuji et al, 1980) and rainfall (Aina et al, 1983; Chijioke, 1992). From field assessment, the major causes of the erosion hazards were uncontrolled run-off, uncontrolled overland flow; faulty construction and deep slope. The land use affected includes highway, human settlements/residential buildings.

Table 1:

LOCAL GOVT. AREA	LOCATION	DIMENSION (m)			CAUSES OF EROSION	LAND USE AFFECTED
		LENGTH	WIDTH	DEPTH		
YAKURR	NJELEKOKO	300	3	10	RUN-OFF	HW
YAKURR	UGBEKUMA	1,500	6	3	VERY STEEP SLOPE/RUN-OFF	SR
YAKURR	AJERE	500	3	5	RUN-OFF	SR
YAKURR	LEKPAKOM	1,800	4	7	RUN-OFF	SR/ST
OBUBRA	ETAPEH	1,000	6	3	RUN-OFF	SR/ST
OBUBRA	OFUKPA	1,200	2	5	UNCONTROLLED OVERLAND FLOW	SR/ST
IKOM	ABAKPA	500	5	6	UNCONTROLLED OVERLAND RUN-OFF	SR
IKOM	CAMEROON STREET	800	2	4	UNCONTROLLED OVERLAND RUN-OFF	SR
IKOM	WATER BOARD ROAD	800	3	1	CONSTRUCTION /RUN-OFF	HW

Source: Field Work, 2002.

KEY

- HW: HIGHWAY
 SR: SETTLEMENT/RESIDENTIAL ACCOMMODATION
 ST: STREET

CONCLUSION

Soil erosion is a serious problem not only in South Eastern Nigeria but nationwide. This work made considerable effort to not only highlight the extent and severity of some of the gullies in Ikom, Obubra, and Yakurr Local Government Areas of Southeastern Nigeria but has taken an inventory of some of the major gullies. From field studies, there is no doubt that adverse climatic conditions (particularly heavy rainfall), soil type and human factor (unwise land use) trigger off the erosion that has caused these gullies. The gullies surveyed were extremely severe, some very deep and frightful indicative of the magnitude of the erosion problem in the central Cross River State, Nigeria. Though the list of the gullies is not totally exhaustive due to the dynamic nature of the problem yet it has brought into focus the distribution of these gullies in these localities.

RECOMMENDATION

A conservation law should be formulated that would compel contractors to ensure safe water disposal for all structures constructed and for all activities that lead to landscape modification. The agents for creating the awareness for soil conservation across the state should include extension agents, the mass media and those involved in teaching soil science or related subjects in tertiary institutions. For teachers in secondary school, soil conservation should be emphasized in the syllabus for Agricultural Science and Biology. Market places in rural areas and cemented yards in the cities should be replaced with grassed yards or drainage-friendly structures. This will enhance infiltration of water into the soil and reduce run-off and flood in our villages and cities to the barest minimum.

REFERENCES

- Aina, P. O., Lal, R., and Taylor, G., 1977. Soil and crop management in relation to the rain forest region of western Nigeria. In *Proceeding of National Erosion Conference*. 25th Feb - 2nd March, Yeette, India.
- Anon, 1990. Rainfall under siege. *Awake Magazine*, March 22, 1990 Pp 2-14.
- Armon, M. N., 1984. Soil Erosion and Degradation in Eastern Nigeria in Relation to Bio-physical and Socio-economic Factor. Unpublished Ph.D thesis, University of Ibadan. Pp 52-54.
- Armon, M. N., 1986. A paper on Sustainable Rural Development in Cross River State presented at the 6th Annual Conference of Nigeria Association of General Studies. 24 - 29th May, University of Calabar, Nigeria.
- Chijioke, E. O., 1992. Erosion, the Environment and Rural Development. In: PP 85-87; Role of forestry in stabilizing fragile ecosystem. Proceeding of the 21st Annual Conference of the Forestry Association of Nigeria, Uyo, AKS, 7-12 April.
- Cross River Agricultural Development Project, 1992. Report on the wetland soils of Cross River State, Nigeria, P 115.
- Cross River Task Force on Erosion Control, 1987. Reports on Erosion Control in Cross River State. Ministry of Agriculture and Natural Resources, Calabar; pp.8-10.
- Elumoye, D., 1991. Erosion: 7 states to share N512 million. *Punch Newspaper* June 15th, Vol. No. 14577. P 8.
- FAO/UNEP, 1983 Guidelines for control of soil degradation. FAO, Rome p.38.
- Famesco, T. F., 1989. The status of soil menace in South Eastern Nigeria and prospects for control. Biennial conference of the Ecological society of Nigeria (ECOSON). Forestry Research Institute of Nigeria Ibadan, 14th - 19th August P 13.
- Famesco, T. F., 1992. Strategies for the control of soil erosion crisis in the forest zone of Nigeria. In pp. 85 - 87; Role of Forestry in a stabilizing fragile ecosystem of the rain forest zone of Nigeria. Proceeding of the 21st Annual Conference of the Forestry Association of Nigeria, Uyo, Akwa-Ibom State, 7 - 12 April.
- Fubera, D. M., 1986. The menace of flood and erosion on environment disaster combat plan. In pp. 11 - 23; Ecological disaster in Nigeria: Soil Erosion. V. Sagnua and Enabor (eds). Proceeding of the National Workshop on Ecological Disaster: Soil Erosion Owerri, 8 - 12 September.
- Keay, R. W., 1959. An outline of Nigerian Vegetation. Nigerian Government Printer, Lagos. Pp. 20 - 26.
- Obi, M. E. and Asiegba, B. C., 1980. The physical properties of eroded soils of Southern Nigeria. *Soil Science*, 130, 48 p.
- Ojanuga, A. G., 1986. Soil Erosion: Nature response to land misuse. In Nigerian National Workshop on Soil Erosion Control. Centre for rural developments and cooperative. UNN, Nigeria.
- Okorie, P. E., 1992. Aforestation of some gully eroded areas of Eastern Nigeria. In pp. 85 - 87. Role of forestry in stabilizing fragile ecosystem of the rain forest zone of Nigeria. Proceeding of the 21st Annual Conference of the Forestry Association of Nigeria, Uyo, Akwa-Ibom State. 7-12 April.
- Wischmeier, W. H. and Smith D. D., 1978. Predicting rainfall erosion losses: A guide to conservation planning. United States Department of Agriculture Hand Book, No. 573, p. 54.