INDIGENOUS APPROACH TO SOIL EROSION CONTROL IN SOUTHWEST NIGERIA

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INTRODUCTION

- Soil erosion has been identified as one of the problems of both rural and urban landscape in the world.
- Poor communities in the developing countries are however more vulnerable, especially with poor technology and financial constraints.
- This is exacerbated by the increased rainfall events and the increasing rate of unplanned urbanization.
- This problem in many of the rural communities is often left unattended to by the statutory authorities; thus left the communities to the use of local materials for the control.
- The study therefore considers it necessary to examine and document the nature, success rates, limitations and possible areas of improvement of the indigenous methods often employed by the rural communities.

STUDY AREA

- The study settlements are within latitudes 6^0 18′ N and 6^0 43′ N, and Longitudes 4^0 50′ E and 5^0 10′ E in Irele Local Government Area (LGA), Southwest Nigeria (Figure 1).
- These settlements fall within the tropical rainforest and the climate is characterized by two seasons namely rainy and dry season.
- The available 10-year meteorological data (1995-2005) show the annual rainfall varies from 1,900mm – 2,700 mm.
- The total population of the study area was 145,166 (Ibitoye, 2006)

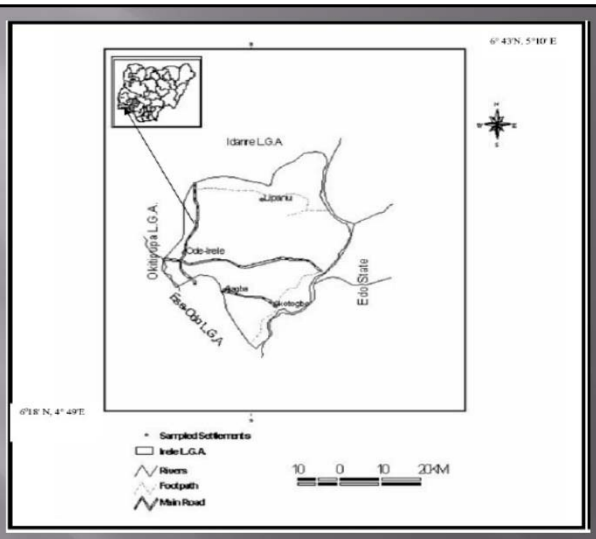


Figure 1: Map of the study area

MATERIALS AND METHODS

- Five settlements were randomly selected namely Ode-Irele, Lipanu, Ajagba, Atoranse and Akotogbo for this study.
- In all the settlements, erosional channels were identified and ten of the channels were randomly selected for the study.
- The catchment area of each gully was delineated based on slope gradient and gully pattern.
- GPS was used to capture the coordinates of all the turning points until area enclosed by the gully catchment was covered.
- The areas of the catchments were divided into grids at interval of 50 metres from which spot heights were determined.
- The data generated was used to produce DEM that described the terrain morphology using GIS ILWIS Software 3.3 version.

OBSERVATION

- Human activities such as construction works and haphazard erection of buildings on steep terrain, encouraged concentration of runoff and gave rise to gully erosion.
- The depths of erosion channels ranged between 1.0m and 5.85m, while width ranged between 2.37m and 5.58m.
- The cross-sectional area ranged between 2.3m^2 and 35.66m^2 .
- The total volume of soil loss from the gullies was 47522.124m^3.
- The area experienced various degrees of sheet erosion, 1st, 2nd and 3rd order gullies which further strengthened by the high amount of rainfall intensity.
- This value correlated positively with surface runoff with $r = 0.55$ ($p \leq 0.05$) which is an evidence that soil loss in these communities was influenced by volume of water generated within the catchment

- The effects of erosion in the study area showed that 24 houses which accommodated about 240 people were at risk at Idogun quarters, Ode-Irele and Ado quarters in Akotogbo.
- Most of the roads in the study area were severely eroded and rendered impassable to vehicular traffic.
- The inhabitants resulted to the use of indigenous ways of checking erosion such as sandbags, stone bags or wooden pegs across the erosional channels.
- Others are grass planting and non-biodegradable materials such as vehicle tyres, were also used as control materials (Plates e-i).
- These indigenous methods seemed to be ineffective as the erosion approaches disaster level particularly when the gully channel become wider and deeper in their width and depth respectively.

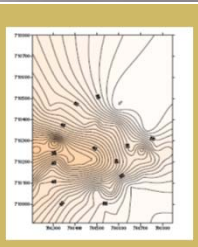
Table 1. Morphometry of the studied gullies based on gully location

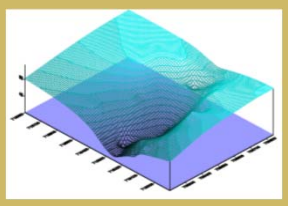
Gully location	Gully order	Gully length (m)	Mean gully depth (m)	Mean gully width (m)	Mean cross sectional area (m^2)	Gully catchment area (Ha)	Catchment slope
Lipanu	1st	61	0.97	2.31	2.27	5.059	0^0 58'27''
LA. Pry. Schl. Area (Ode Irele)	1st	750	3.07	5.14	21.95	86.895	1^0 06'06''
Idogun Qtr (Ode Irele)	3rd	340	5.5	7.83	37.89	25.889	2^0 06'00''
Ajagba	1st	214	1.54	3.32	5.57	11.887	4^0 51'31''
Ado Qtr Akotogbo	2nd	130	2.66	4.79	12.48	13.269	3^0 02'41''

Table 2. Soil properties and Sediment loss from the studied gullies

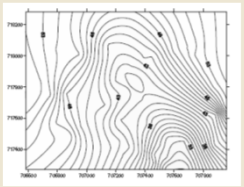
Gully location	Mean bulk density (g/cm^3)	Soil texture			Volume of soil loss (m^2)	Sediment loss (tonnes)
		% sand	% silt	% clay		
Lipanu	1.45	54	14	32	132.47	192.08
LA. Pry Schl area (Ode Irele)	1.61	63	07	30	16147.10	25,996.83
Idogun Qtr (Ode Irele)	1.88	59	04	37	16861.77	31,700.16
Ajagba	1.65	63	07	30	1167.54	1,926.44
Ado Qtr Akotogbo	1.89	56	03	41	13213.25	24,973.04

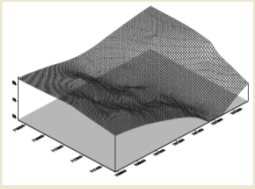
Contour and DEM of gully catchment area





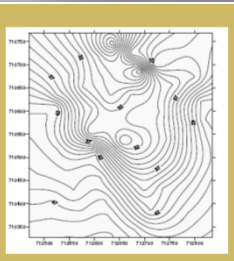
Idogun Quarter, Ode Irele

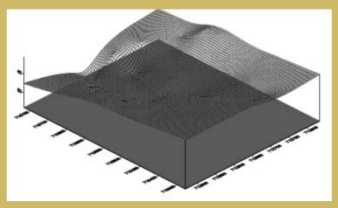




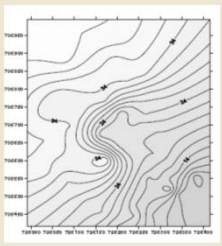
LA Primary School, Ode Irele

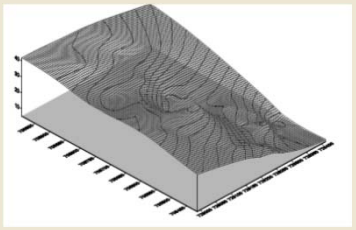
Contour and DEM of gully catchment area





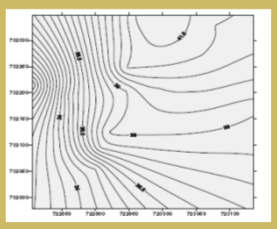
Ajagba

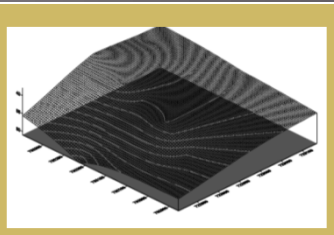




Ado quarter Akotogbo

Contour and DEM of gully catchment area





Lipanu

Effects of gully erosion on the housing properties

a

b

c

d

Examples of indigenous methods of erosion controls

e

f

g

h

CONCLUSIONS

- Sheet erosion and gullies have been promoted by both man-induced and natural forces in the study area.
- Though the study found that the erosion problem had not reached a disaster level when compared with gullies in Eastern part of Nigeria.
- However, it was noticed during this study that lives and properties were at risk and yet government intervention was not forthcoming.
- Consequently, the inhabitant resulted to the use of indigenous erosion control methods which the study found to be ineffective.
- The study therefore advocate for proactive measures to arrest the situation rather than the 'fire brigade' approach often employed after tragic event has occurred.
- Integration of data generated into information management system on erosion control, not only in the study area, but in other rural communities with similar climatic and physiographic attributes is also advocated.

THANK YOU FOR LISTENING.