



The menace of the Geo-Environmental hazard caused by gully erosion in Abia State, Nigeria



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HIGHLIGHTS

- A research work based on interaction and reconnaissance questionnaires.
- A true representative of the environmental problems facing the Abia State that need urgent attention.
- It gives a clue to what to face in terms of remedy measures from experts.

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ABSTRACT

The menace of Gully Erosion in Abia State has been studied and evaluated and the results of the reconnaissance and observation survey showed that most of the communities in the state are faced with this problem. The present research has proposed methods on how to mitigate this Geo-Environmental problem, which included the use of slope drainage, turfing, shotcreting, retaining walls, sheet pile walls, change of slope geometry, reinforced soil wall, crib wall, gabion wall, contiguous bored pile wall, Geotextiles and soil nailing. The state Ministries of Environment and Works should consult experts in the field of Geotechnical Engineering towards putting to an end the menace of gully erosion in Abia State.

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1. Introduction

Gully Erosion has been a source of worry in almost all the 17 local governments and most communities in Abia State. This has led to Geo-Environmental decay and loss of major roads in the state. Many communities have been cut off from the major urban dwellings where they carry their farm produce for sale. Unfortunately, the government has not taken any step towards the evaluation of the extent of decay caused by gully sites to proffer solutions to end this menace (Abulfatai et al., 2014; Hamed et al., 2012; Shu-Wei et al., 2013). Gullies start unnoticed most times, but end up washing farmlands, pavements, and other Geotechnical facilities on its route, thereby leaving the environment in a state of decay (Nemes and Constantinescu, 2011; Andrew, 2011). When this happens, the socioeconomic life of the affected localities is thrown into disarray. This is because when farmlands are washed away, farmers whose source of livelihood rests on the farm produce are left with the pain of the loss of their crops, road users are left to suffer the decay on the pavement facilities or in most cases they are cut off completely from the rest of the other suburbs and urban settlements (Imasuen et al., 2011;

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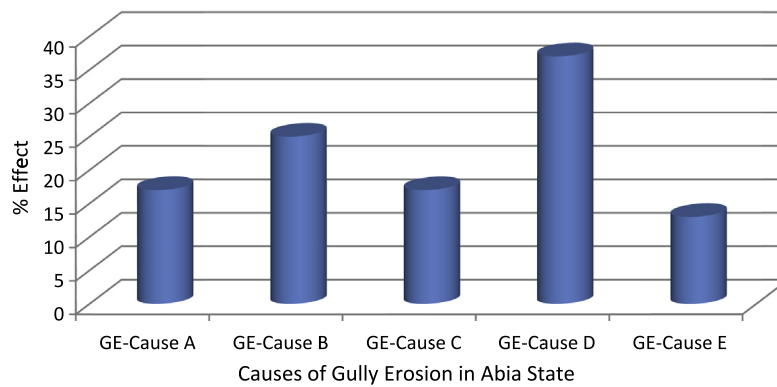


Fig. 1. Percentage effect of the causes of Gully erosion in Bende LGA.

Nwilo et al., 2011; NEWMAP, 2016; Yoshinori and Makoto, 2014). Observation and reconnaissance survey of the major gully sites has shown that Umuada–Umuetegha Nvosi road, Umuetegha–Umungbogho road, Umuhu–Umuehim road, etc. in Isiala Ngwa South LGA, Bende–Ohafia road, Ebem–Okuno road, Bende–Igbere road, etc., in Bende and Ohafia Local Government Area, Umuakwu–Amachi Nsulu road in Isiala Ngwa North Area, Amuzukwu, Olokoro etc., roads in Umuahia South LGA, Umuda Isingwu and Okpara Square gully sites in Umuahia North LGA, Uturu gully site in Isikwuato LGA, Oboro gully sites in Ikwuano LGA, etc., have been destroyed or completely cut off from neighboring communities or cities by gully erosion. Geotechnical and Geo-Environmental engineering offer procedures towards solving gully erosion problems ranging from slope stabilization, landscaping, channels and drains, etc. The main aim of this work was to study the erosion sites and suggest possible Geotechnical engineering solutions to end this scourge.

2. Methodology

Reconnaissance and observation survey was the method adopted to evaluate the extent of decay caused by gully erosion in the state of Abia. Data collected by oral questionnaire from the people actually affected in these localities were studied and analyzed. Abia State is located on latitude 5.4309° N and longitude 7.5247° E covering an area of 6,320 km² with an average rainfall of 2050 mm between its northern and southern ends. Abia State has a variety of land forms, despite the fact that it is dominated by flat and low-lying land, generally less than 120 m above sea-level. The low-lying plain is the inland extension of the coastal plain from the Bight of Benin. The central part of the state is characterized by undulating land with many hills. The highland areas are part of the Enugu–Nsukka–Okigwe cuesta. This area has an average height of between 120 m and 180 m above sea-level. From Okigwe (Imo State), this escarpment extends in a west–east direction and, on getting to Afikpo (Ebonyi State), veers southeastwards to Arochukwu where it terminates. During the survey, the following causes of the gullies were identified (An-Bin et al., 2012); (i) lack of drainage facilities, (ii) badly constructed road pavements, (iii) negligence to rainfall and runoff volume during the design stage of drains, (iv) dumping of solid waste on drain channels and (v) wrongly located building structures as a result of wrong planning.

3. Results and discussions

For the purpose of handling, the identified causes of gully erosion in Abia State were labeled GE-Cause A: lack of drain facilities, GE-Cause B: badly constructed road pavements, GE-Cause C: negligence to rainfall and runoff volume during the design stage of drains, GE-Cause D: dumping of municipal solid waste on drain channels and GE-Cause E: wrongly located building structures as a result of wrong planning, (where GE is Gully Erosion) and the responses from the affected local governments in Abia state were evaluated in percentage. The evaluated responses from the eight local government areas of Abia State badly affected by gully erosion are tabulated and plotted in Figs. 1–8. The figures show the responses based on the degree of effect on the people and their socioeconomic lives. It can be deduced that GE-Cause A; lack of drain facilities predominated with its influence on the environment, which was followed by the GE-Cause D; dumping of municipal solid waste on the drain channels. GE-Cause C and E were of less effect except at Ohafia and Umuahia South Local Governments where they recorded remarkable influence on the environmental response and the effect on the socioeconomic lives of the people. This may have been caused by negligence to the urban master plan of these urban centers which has led to the prolonged effect of runoff and flow through inappropriate channels.

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