

Environmental Sensitivity Index Mapping and Assessment of Gully Erosion Sites in Anambra State –Nigeria.

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Abstract

This research focuses on the environmental sensitivity index mapping and assessment of gully erosion sites in Anambra State. It was motivated by the increasing destruction of lives and properties in Anambra State through gully erosion menace and the need to identify the geographical locations and magnitude of these sites in addition to factors responsible with a view to proffer solutions. It pursues map production as a way to visually display the locations of these gully sites. Gully sites in Anambra States were identified through literature and field investigations. Geographic positioning system (GPS map 78) equipment was employed to obtain the coordinates of the sites. Digital camera was used to take photographs of identified sites. Factors responsible for the gully formations were obtained through literature and field investigations. The coordinates of the gully sites were plotted on the geo-referenced map of Anambra State to indicate the geographic locations of the sites. The gully sites were categorized into four using: (i) depth of the gully site, (ii) length of the gully, and (iii) level of destruction of lives and properties so far, as criteria. Results obtained showed that there are 166 gully sites in Anambra State, categorized into (i) Most severely, (ii) severely, (iii) moderately, and (iv) slightly gully sites. It identified both natural and anthropogenic factors such as nature of the landscape, soil, rocks and surface water; demographic factors, bad control measures and poor appreciation of erosion problems among others as being responsible for gully erosion menace in Anambra State. The research recommends tree planting campaigns, control of soil and sheet erosion early enough, development control measures and environmental education among others as solutions to gully erosion problems in the State.

Keywords: Gully erosion, Erosion, Environmentally Sensitive Areas, Index mapping, Anambra State maps

1.0 Introduction

Over 70% of the land of Anambra State are presently ravaged or threatened by sensitive or risky sites which are at various levels of development and stages of maturity. These sites are mainly gully erosion sites while others are deforested sites, and sand mining sites. Over 20% of the lands have been lost to these (Anambra State Government, 1994).

As a result of the direct and indirect transfer of technology and modern living standards from the industrialized world to developing countries such as Nigeria, and the living population explosion with its attendant effects, problems of many environmental execution of gigantic or small-scale projects of industrial or engineering nature, the possible changes in the structure of soil or rock is rarely thought about or even considered. Irrigation schemes, major road network, small and large scale dams, rural development and urbanization programmes, engineering constructions across flood-ways etc. are executed day-in-day-out without proper studies of the nature of the environment.

Thus lives and property are regularly lost. Houses with the entire families living in them have often been swallowed by landslides in Nanka, Agulu, Nnewi, Ekwulumili, Obosi etc. sometimes major landslides carry along many houses, trees, roads, all standing as they were, into loose flood plains or wide deep gully bottoms. Poorly constructed roads that become major flood channels later were wantonly contracted out and built. Ancient and recent natural flood/stream/river channels are often blocked with buildings without leaving enough safety flood flow measures. Sensitive drainage areas, wetlands and flood channels are encroached upon by hungry land developers. Unapproved and unplanned buildings spring up in Anambra State within and across these environmentally sensitive areas and later block them. Excavations of red earth, laterite and sands are carried out anywhere and anyhow, often without proper planning, or permission from the relevant government authorities. The harmful deforestation and devegetation activities have resulted in the continued loss of the rainforest belt, and the consequent savannization of parts of Anambra state. These devastating events have kept the citizens of the state in a state of continuous concern and fear and dismay all the year-round. Land, lives, infrastructure, and property are regularly lost yearly. The citizens are now so threatened and desperate for their life existence and

sustenance. However, the correct locations of these sites, magnitude of the problems which would enable the government set proper priorities will need to be identified. This research was set to achieve this purpose.

1.1 Research Objectives

This research pursued the following objectives:

1. To identify the locations and magnitude of the environmentally sensitive areas of gully erosion in Anambra State with a view to present it in a map for ease of assessment.
2. To grade the sites and provide environmentally based solutions to the gully erosion problems in the State.

2.0 Characteristics of the Environment of Anambra State: The Study Area.

The climate of Anambra State is an equatorial tropical rainforest type. It is characterized by two main seasons; the rainy (wet) season and the dry seasons. The rainy season is characterized by heavy thunderstorms and lasts between the months and April and October. The dry seasons extends from November to March, annually.

The rainy season is also characterized by relative high temperature (330) and high relative humidity (85%). The dry season is characterized by chilly and dry Hartmann winds. This lowers temperature appreciably especial in the months of December and January. Its main features are; excessive evaporation, low relative humidity (26%) low rainfall, and general dryness. These result in the drying of vegetal cover and subsequent bush burning that cause high rate of fire accidents, shedding of leaves by deciduous trees, harvest of farm produce etc.

In most parts of Anambra State, temperature is usually high all over the year. The average maximum and minimum temperatures are about 320c and 2500c respectively. Annual rainfall is also relatively high, with a mean of about 2000 mm. This rainfall, usually in form of thunderstorms concentrated during the rainy season with large runoff volume, is of significant environmental importance. It initiates deep weathering and leading of soils and rocks in the area. The high intensity of rainfall and the concomitant large volumes of runoff generated accelerate erosional activities, and degrade the soil. The prevalent erosional activities in the form of sheet wash, rill/channel erosion and gully erosion have caused huge damages to the landscape especially along the slope of the Awka-Orlu escarpment which traverses much of the central parts of Anambra State. Figure 1 shows the map Nigeria indicating Anambra State.



Fig. 1: Map of Nigeria showing Anambra State

The Rainforest Belt is characterized by growth of tall trees amidst thick undergrowth. The trees have luxuriant

foliage. The presence of climbers and epiphytes forming complex tangles is common place. The forest with graded tops and continuous canopy of wide leaves are typical where human activities are limited. Oil palm trees are common, and swampy areas have thick cover of raffia palms. This typical tropical rainforest vegetation is disappearing in many parts of Anambra State, giving way to derived savannah vegetation of scrambled and bushes. This is due to high rate of human activities in form of deforestation as lands are cleared for purposes of farming and construction. Formation of pockets of derived savannah grassland is also accelerated by active erosion.

The most outstanding feature in the area is the Awka-Orlu escarpment with its eastern, gully indented scarp slopes. Its dip slope runs gently with indulative topography, dipping southwest wards into the plains of the River Niger near Onitsha. The dip slope has a major gully complexes develop in it. The Oraukwu gully extends to Alor at the slope of the Idemili River. Nri stands on a mock hill which is bounded by two extensive depressions, hence forming a seemingly prototype horst. The surrounding depressions or gorges are possibly fault lines and grabens.

The soils in Anambra State vary from loose variable sandy soils to compact, wet and plastic clayey soils. Most of the soils are laterite in nature and are often derived from the underlying geologic unit or transported from nearby areas. Some of the soils are cemented and indurated to form thin to thick ironstone capping or bands. They vary from dark greenish-gray, gray to reddish brown, brandish to yellow in colour. Some are however mottled or variegated. Their thickness varies from a few centimeters to more than 20m in extremely thick ones (Onwuka, 2008).

Anambra State occupies a greater part of the central to the Western section of the Anambra Basin. The basin formed during the santonian tectonism resulted in the folding, upliftment of the Abakaliki-Benue trough and the subsidence of the Anambra platform. This forms a major depocentre of clastic materials. The basin was filled with sediments to form a large deltaic complex during the Eocene, and later. There is no known evidence of magnetic activity within this basin, hence crystalline rocks are absent. The main lithologic unit of geologic importance includes

- a. Benin formation (coastal plains sands);
- b. Ogwashi-Asaba formation;
- c. Nanka sands/Nsugbe formation and
- d. Imo shale

3.0 Research Method Used

The research concentrated on gully erosion sites in Anambra State being a major environmental problem in the area. From literature, names of communities affected by gully erosion were obtained. These communities were visited by the research team where the following data were collected from the gully sites and its surrounding:

- i. The location and geographic co-ordinates of the gully erosion sites through the use of Global Positioning System (GPS).
- ii. Digital photograph of the gully erosion sites.
- iii. Factors responsible for the gully erosion problems- both natural and anthropogenic.

The field work was carried out in August and September, 2013. Specialists involved in the work were Environmental Manager, Urban Planner, Geologist, Surveyor and Geo-informatics expert, Geographic positioning system expert, expert in impact identification, qualification and mitigation measures. Field assistants were also used.

The existing analogue Administrative Map of Anambra State was obtained from the Ministry of Lands, Survey and Urban Planning, Awka. It was scanned using the HP AO Scanner. The scanned raster data (Map) was then imported into the AUTOCAD Land Development 2004 Software. Rubber sheeting was carried out. The Local Government names were inserted into the digitized map using the Auto text tool.

The co-ordinates of the gully erosion sites collected from the 166 gully sites visited were plotted on the georeferenced map of Anambra State to indicate the geographic locations of the sites. These coordinates were acquired using the GPS MAP 78 and stored in Microsoft Excel format.

The positional data (coordinates) of the different categories of gully erosion were used to plot the positions of the erosion. Different symbols were used to depict four different categories of gully erosion. The categories are:

- i. Category one – most severely gully sites
- ii. Category two – severely gullied sites
- iii. Category three – moderately gullied sites
- iv. Category four – slightly gullied site

Three factors were considered as the criteria for the categorization of gully sites. These are:

- i. Depth of the gully site
- ii. Length of gully site
- iii. Level of destruction of lives and properties so far

For most severely gullied sites, the depths are from 90m and above. Severely gullied vary 70m to 90m. Moderately gullied vary from 40m to 70m. While slightly gullied ranges from 5m to 40m.

With respect to the length of gully sites, most severely gullied sites were estimated from 500m and above. Severely gullied, between 250m to 400m; moderately gullied sites, between 150m to 250m while slightly gullied, between 50m to 150m.

On the level of destruction of lives and properties, nearby residents of the gully sites were interviewed to obtain the level of destruction that has taken place so far as a result of the gully effects. Interview result reveals that gully effect ranges from one degree of destruction to another. Such as devastating roads, buildings, farm lands, springs, streams as well as threatening homesteads. Others are loss of human and animal lives, markets, schools etc. Percentages were assigned to each level of effects. Most severely; 90% and above; severely- 60%-85%; moderately gullied – 20% - 55%; while slightly gullied from 5%-15%.

4.0 Presentation of Results

4.1 Maps Produced

4.1.1 Digitized map of Anambra State showing the local government areas

Figure two shows the digitized map of Anambra State with the 21 Local Government Areas. It is clear that Anambra State has boundaries with Enugu, Kogi, Delta, Imo, and Abia States of Nigeria.

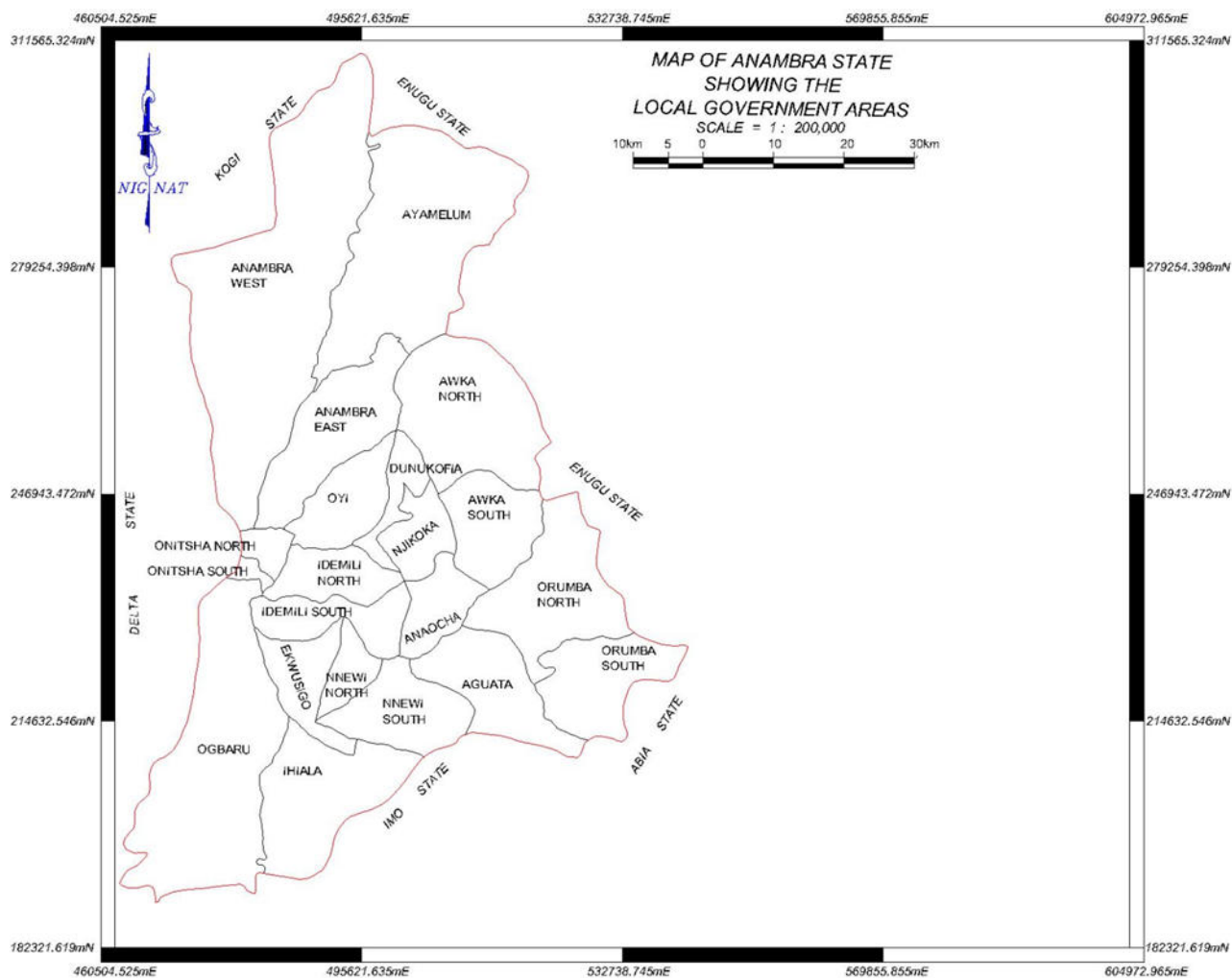


Fig.2: Digitized map of Anambra State showing the local government areas

4.1.2 Map of Anambra State showing the communities with gully erosion sites

Figure 3 shows the map of Anambra State indicating various communities with gully erosion sites and affected by gully erosion problems.

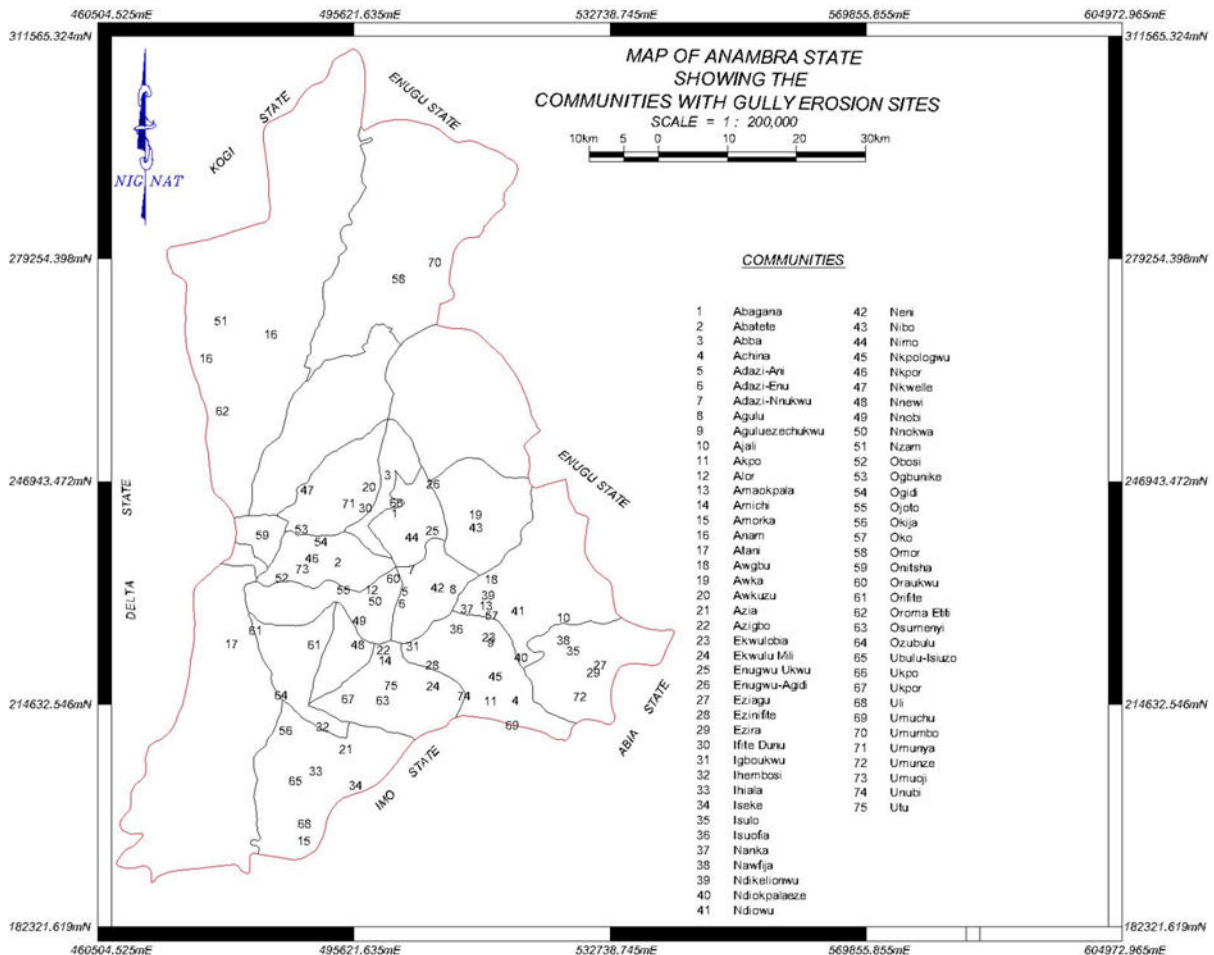


Fig.3: Map of Anambra State showing the communities with gully erosion sites

The map shows that out of 177 communities in Anambra State, 75 communities are affected by gully erosion. This ranks Anambra State highest in the entire Eastern States of Nigeria in terms of gully erosion affected States. The gully sites were assigned names according to the communities they exist.

4.1.3 Map of Anambra State showing the category one gully erosion sites

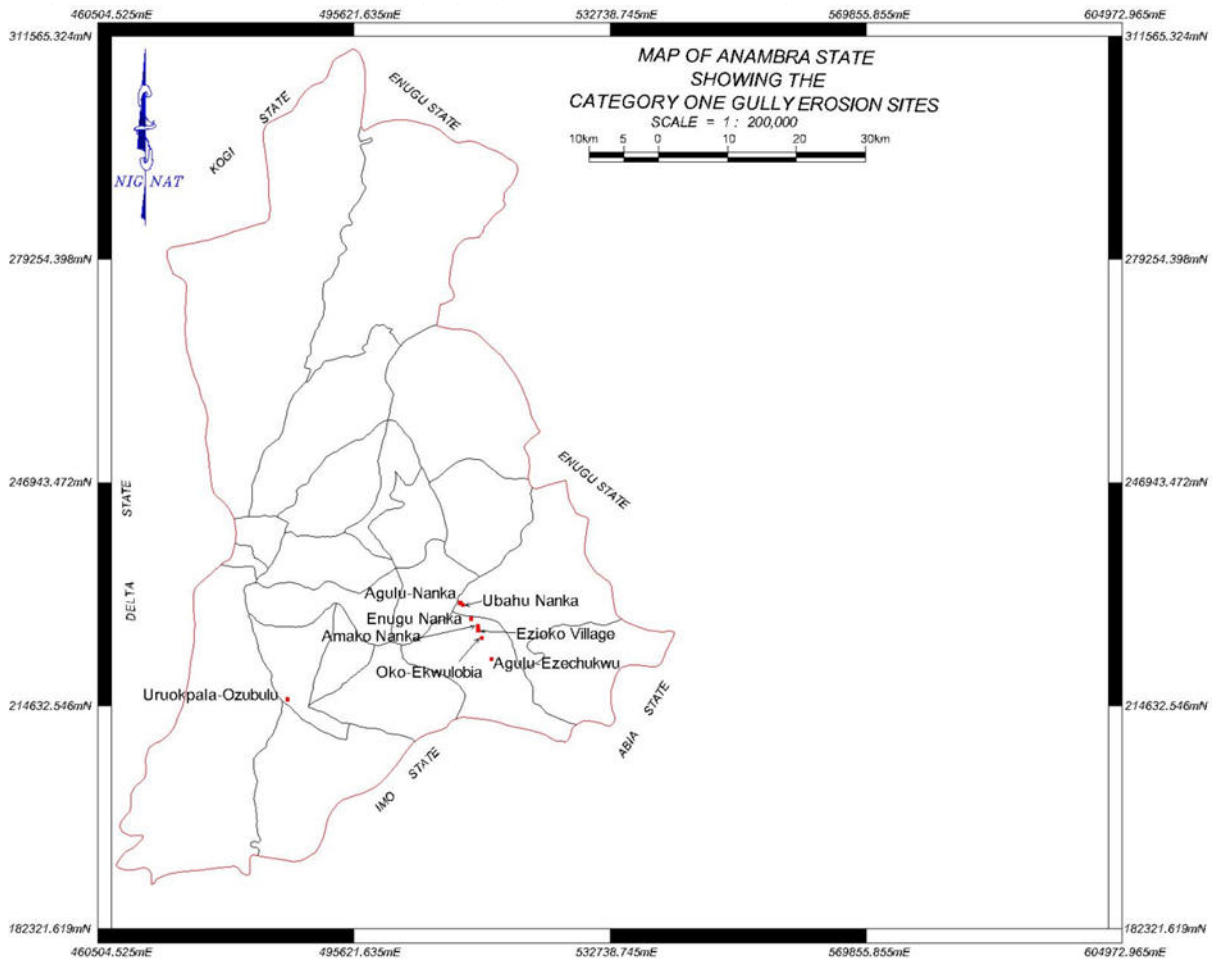


Fig.4: Map of Anambra State showing the category one gully erosion sites

Category one gully erosion sites are the most severely gully sites. The depths of the gullies are over 90m with lengths of 500m and above. These most severe gullies have destroyed several lives, homesteads, buildings, lands, streams, roads, etc. They require a lot of funds to be controlled. As at the time of this research, the effects of these sites are still on the increase. These gully sites are located in Ubahu Nanka, Agulu Nanka, Enugu Nanka, Amako Nanko, Ezioko, Oko-Ekwuluobia, Uruokpala-Ozubulu and Agulu-Ezechukwu as indicated on the map.

4.1.4 Map of Anambra State showing the category two gully erosion sites

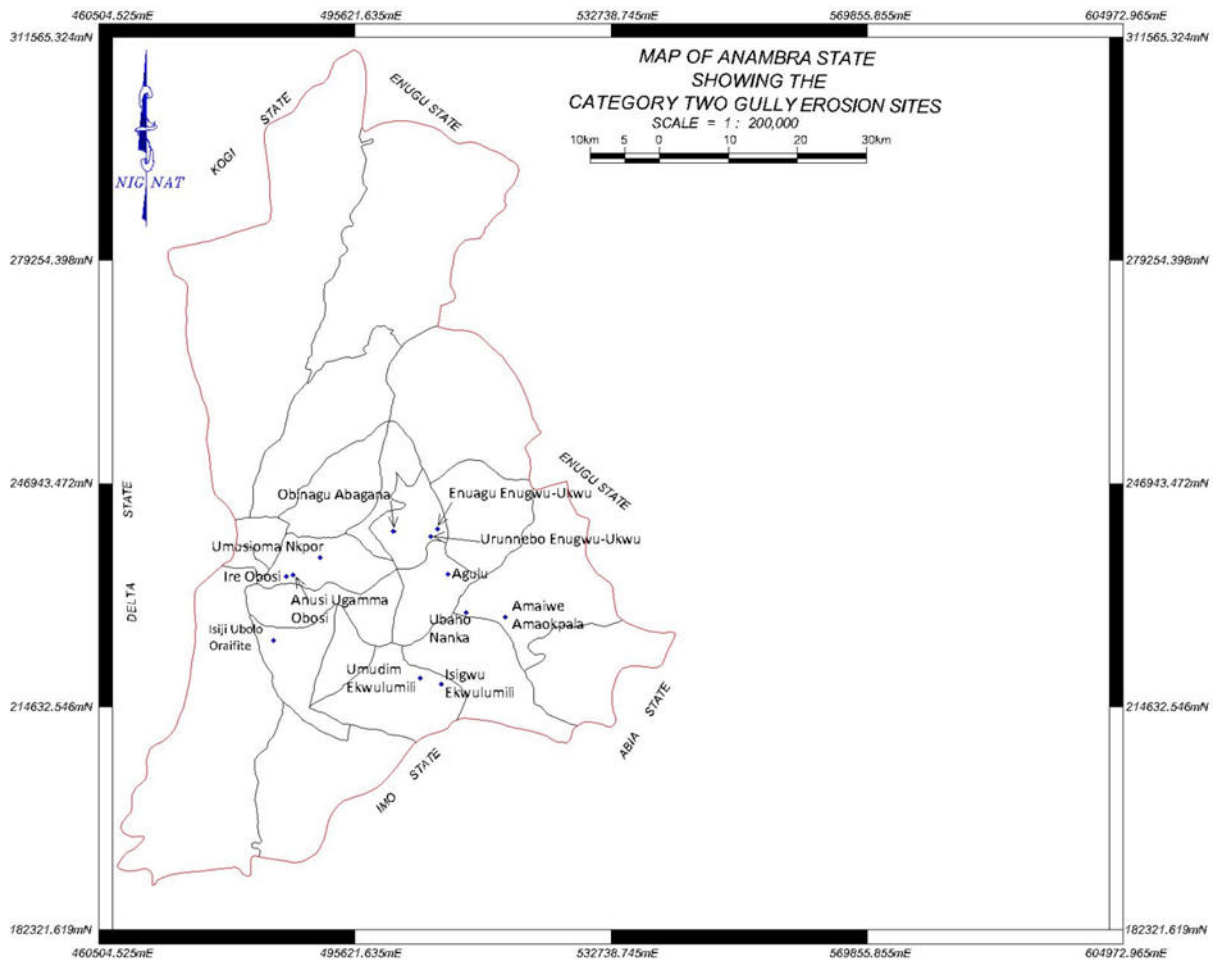


Fig.5: Map of Anambra State showing the category two gully erosion sites

Category two gully erosion sites are the severely gully sites. The depth of the gullies varies from 70m to 90m with length of between 250m-400m. These sites have brought destruction to lives and properties rated to be between 60% - 80%. Category two gully sites are located in Obinagu Abagana, Enuagu Enugwu-Ukwu, Umusioma Nkpor, Ire-Obosi, Isiji Ubolo Oraifite, Anusi Ugamma Obosi, Agulu, Ubaño Nanka, Umudim Ekwulumili, Isigwu Ekwulumili, Amaiwé Amaokpala, and Urunnebo Enugwu-Ukwu.

4.1.5 Map of Anambra State showing the category three gully erosion sites

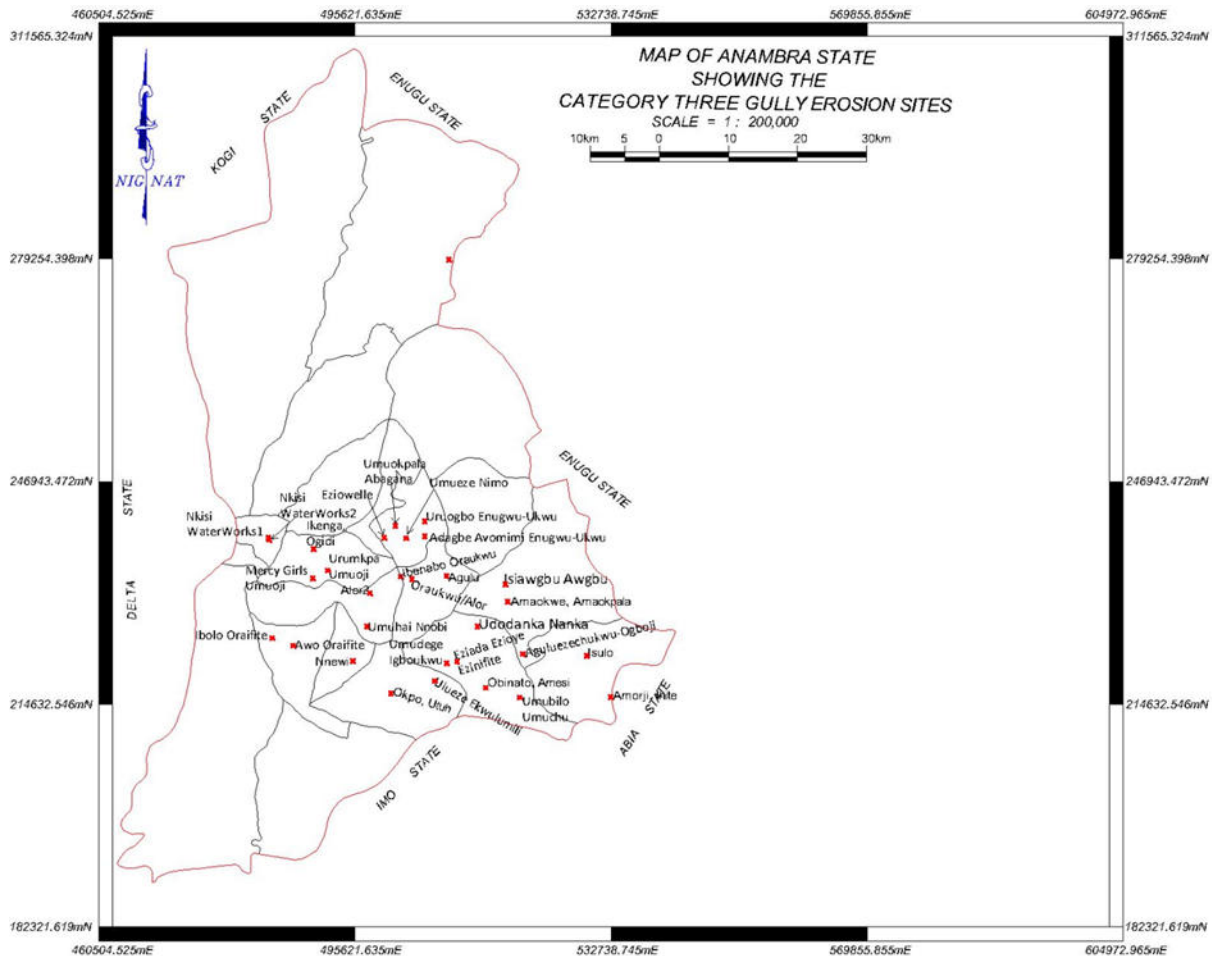


Fig.6: Map of Anambra State showing the category three gully erosion sites

Category three gully erosion sites are the moderately gully sites. The depths of the gullies vary from 5m to 50m with length of between 150m to 250m. These sites have also brought destruction to lives and properties. The map shows that there are 30 moderately gully erosion site in Anambra State. Some of these sites have received a measure of control but not yet subdued.

4.1.6 Map of Anambra State showing the category four gully erosion sites.

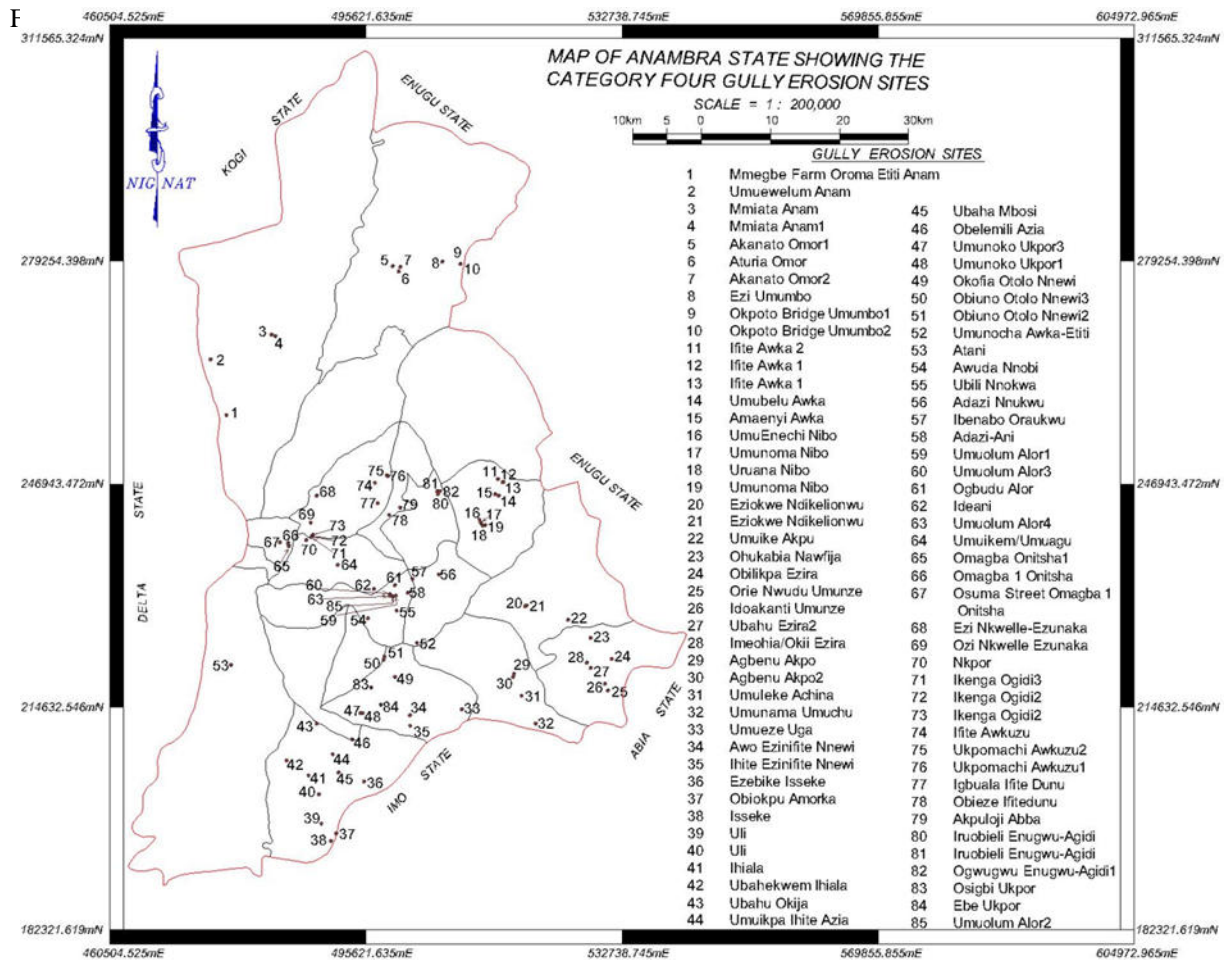


Fig.7: Map of Anambra State showing category four gully erosion sites

Category four gully erosion sites are the slightly gully sites. The depth of the gullies varies from 5m to 30m with length of between 50m to 150m. These sites have also brought destruction to properties and the natural environment especially the vegetative covers. However, as at the time of this research, many of them are under control through the use of trees especially bamboos. Besides, more effort is needed to ensure that they are permanently checked. The map shows that Anambra state has 85 slightly gullied sites.

4.2 Digital Photographs of some selected gully sites in Anambra State

One photograph was selected for display in each of the categories. Below are the photographs:



Plate 1: Gully site at Amako village Nanka-category 1



Plate 2: Gully site at Obinagu village Abagana- category 2



Plate 3: Gully site at Isiji Ubolo village Oraifite-category 3



Plate 4: Gully site at Isigwu village Ekwulumili-category 4

4.3 Assessment of Gully Erosion Sites.

4.3.1 Factors Responsible for Gully Erosion in Anambra State

A proper understanding of the causative factors of gully erosion in Anambra State would solve the problem half-

way. It will also enable a planner have a good appreciation of the problem, carry out adequate investigations, produce and execute well designed control programs that solve such problems on a permanent basis. Natural and (or anthropogenic (man-made) factors are responsible for the gully erosion problems in Anambra state. These factors are therefore discussed:

4.3.1.1 Natural Causative Factors

a. Nature of the Landscape

Hilly, sloppy and sandy areas are easily eroded and peneplained. Hence, cuestas or escarpments are products of a continuous geomorphic evolution of the landscape that produce surfaces highly amenable to erosion as presently found in Agulu-Nanka and Alor-Oraukwu areas of the state.

b. Nature of the soil

Sandy soils are more easily eroded than clayey area. Soil erosional events are greatly influenced by the geologic (rock) and pedologic (soil) cycles of the catchment area or watershed. A clayey or shaley area may be eroded slowly, gradually and continuously until a sandy zone is intersected. The rate of erosion then changes. This has been observed in parts of Anambra State, depicting classical erosion cycles in nature.

c. Nature of rocks or Geologic Units

Predominantly sandy geologic formations, members or units are more easily eroded than shaley ones. Unconsolidated materials are again more amenable to erosion than consolidated ones. Furthermore, sedimentary rocks are eroded as opposed to igneous and metamorphic ones which form stable platforms. The geologic factor is still ignominiously-ignored by erosion control experts, environmental planners and managers in Anambra State; an absolute show of possible ignorance in the role of geologic effects.

d. Nature of surface water and ground water

Surface waters in form of floods, streams, rivers raindrops/runoff water; and groundwater flows, efficient/see pages, etc., are major causative agents in erosion in Anambra State. Environmental planners, managers or scientists are more familiar with surface water factors. In situations where the surface water component is checked, leaving the ground water aspect, such control structures would ultimately fail through subsurface flows and undermining. Gullies at Agulu, Nanka, Oko, Alor, Onitsha, Oraukwu etc have ground water causative components. Major landslides occur whenever a gully face intersects the water table of unconfined aquifers of the piezometric surface of confined ones.

e. Total Natural Phenomena

The dynamics of nature such as earth rotation wind movements and air pressures, temperature and other climatic changes, mass wasting, natural human living styles, activities and standards, isostatic changes, neotectonic activities, changes in land and sea levels, etc. are total natural and continuous processes. They reduce or raise the landmass naturally when there is no serious interference by man. Erosion becomes a part of the outcome. Under normal conditions, the volume of the earth's landmass should be at a quasi-steady-state with acceptable soil loses (and gains) yearly without major threats to the environment. But when a serious or anomalous interference by the elements or particularly by man occurs, the natural mass balance of sediments is disturbed, and erosion becomes a major hazard if not controlled.

4.3.1.2 Anthropogenic (man-made) causative factors

a. Demographic factors

As a result of the improved living conditions and standards, better health facilitators, more foods etc., there has been a major increase in human population in the last fifty years. Child mortality rate has been reduced. Age longevity of adults has increased. There has been massive population growth most recently in Anambra state in particular and Nigeria in general (Okoye, 2005). There are more people living and indulging in varied human activities (farming, industrial concerns, infrastructural developments etc.) that put stresses on the environment. These may trigger off soil gully erosion and landslides. Forests, through deforestation and bushes, through devegetation, are cleared for human habitation, agricultural practices, industrial establishments, road construction, and rural development etc. intense farming activities sometimes using wrong methods, loosen the soil/rocks for mass wasting. These are in attempt to produce more food to feed more hungry mouths. Increased economic activities result in the building of more markets/trade centers, more roads to carry heavier traffic, more houses to accommodate economically active people etc. Demands imposed by increased population and their attendant stresses must be considered as major factors of erosion causation in Anambra State. Higher population growth put many humans into the environment, thereby putting more negative stresses and strains that destroy it.

b. Non-understanding and Poor Appreciation of Erosion Problems

A fundamental underlying factor is the non-understanding or poor appreciation of the causative factors, their magnitude and the long term negative effects of gully erosion and landslides problems in part of Anambra State. Both the illiterate populace and the so-called educated elites, including some engineers and scientists, suffer from this cancerous cankerworm, a disease of erosion-ignorance (Onwuka et al. 2009). These people, who may even be erosion agents themselves, are not bothered until their lives, property or communities are affected. Then, they would start to cry foul and shed crocodile tears, unaware that over 30% of their watersheds have been lost to

erosion over the years.

c. Conflicting/ bad Control measures

The present control measures in erosion-prone areas are sometimes in conflict, and wrong. Such practices are carried out without considering in detail the dynamics and site specific nature of the erosion problems. Short and/or long term control measures that are not in conflict, and that are relevant to each gully area are rarely used to prevent such conflicts. Biological agro-forestry, engineering and socio-economic control methods can be used, singly or jointly in an integrated manner with designs based on proper feasibility studies and data analysis. Presently, this type of planned control strategy is not in use. Rather, ad hoc and hocus-pocus (confusion) approach is in vogue. Some people prefer to play politics and fraud with erosion problems while the state and her citizens suffer and die, and refuse the scientific facts and realities of erosion.

5.0 Mitigative Measures towards control of Gully Erosion problems in Anambra State

The environmental problems of floods, soil and gully erosion and landslides that have assumed disastrous consequences in Anambra State demand carefully-well planned and executed multi objective but integrated study and control programmes that shall become permanent. The environmental planners and managers that shall be involved must show the highest degree of commitment, expertise and morality.

They must have genuine and good conscience that shall encourage the management of whatever meager financial resources that is made available. The problems are so complex monstrous and dynamic, and must be equally-understood as such. Moral, expert, and financial assistance shall be widely sought for. Seminars, workshops and symposia on the problems for environmental education and enlightenment shall be regularly arranged. Sub-catchment management strategy of floods, gully erosion and landslides control shall be employed. Continuous environmental monitoring, protection and management to ensure that control projects are in place shall be carried out. It has been, however found out that the mere engineering/physical control of gullies by concrete works cannot solve the problems on a permanent basis. There must be the agro-forestry aspect (which include the use of Alley cropping system, use of multi-purpose and ornamental trees and shrubs, the use of vetiver and Bahamas grasses, the uses of bamboo plant etc.) which will aim at restoring the site to an approximate natural environmental; and monitoring/maintenance of such projects and public enlightenment. Tree planting at open lands and spaces, and grassing along road sides and open spaces are highly recommended. The present devegetation of our environment is discouraging while total planting up and greening of bare soils are strongly advised. Farmers have to learn new methods of farming which will incorporate soil conservation techniques; so must our environmental managers and developers. This calls for effective extension services and some financial incentives to the farmers and environmental managers to adopt new techniques. Road builders, town planners, and developers must learn the implications of their action on erosion causation and development; and organize contingency measures to tackle such environmental disaster now starring Anambra State in the face.

It has also been noted that the level of knowledge about the environment by Anambrarians is still very low. Serious and sustained environmental education is required to change the old-erosion-causing attitudes and habits. Both adults and children should have this environmental education. All necessary educational materials should be used. Government officials, politicians, traditional and community leaders and school authorities must be involved.

6.0 Further Recommendations

The following further recommendations are made:

1. Since this gully-control work is aimed at development of systems and technologies that are both suited to local conditions and adaptable at the grass root level. It is therefore suggested that agro-forestry nurseries containing more of erosion control species in the various local government areas of the State be developed. The nursery should contain not less than 50,000 – 100,000 seedlings or cuttings of each erosion control species for distribution to rural areas for planning.
2. “catch them young” should be made the best approach to gullies-control and more emphasis should be placed on this approach, using agro-forestry practices and other preventive techniques, in areas not yet seriously affected by soil and gully erosions.
3. Part of the efforts and resources should also be directed towards preventive and control of soil and sheet erosion early enough to prevent the trigger-off of massive gully erosion. Sheet erosion is widespread but because they are not as dramatic as gully erosion, people tend to neglect or ignore their existence. Yet when they develop they do so with a bang!
4. Tree planting campaigns should be intensified and there should be legislation/laws for afforestation and against deforestation. Enlightenment and consciousness in erosion control should include land use habits of the people in their agricultural practices and care of vegetation.
5. The people can recapture the earlier habit of planting economic and ornamental trees on their lands and

in their homes, thereby greening up everywhere-depicting the natural rainforest belt that is now disappearing from all over Anambra State.

7.0 Conclusion

Reasonable men do not sit to wait and yell at their misfortunes! They stand and fight them. Neither a geologist is needed to postulate or a doctor of divinity to predict what will be the fate of Anambra State in the nearest future if the present rate of erosion menace is allowed to persist unfettered. The disaster is now foreseeable, imminent and clear. Our lands are vanishing under our lackadaisical gaze. Utter economical hazards are staring everyone in the face and destroying humans and the environment daily. Towns all over the state are contending with the stunning maladies of gullies. Every morning, one wakes up to a cacophony of cries and wailings from communities been destroyed or threatened by erosion. Villages and towns are facing extinction as a result of the havocs of erosion. Towns caught in this mesh lament their misfortune, and fear that they might go the way of the fabled lost continent of Atlantis. Never in the past, have so much been lost by so many to erosion in this part of the world. It is hell on earth!

Hopeless as the situation may appear now, it can still be arrested if timely, realistic and concerted steps are taken. Erosion behaves like a cancerous tumor. The painless tumor of today if unsevered by painful surgery immediately may develop into a grievous and fatal cancer of tomorrow. On the other hand, the harmless rills of flood you see and underrate today may become the imposing valleys of tomorrow.

The cases for Nanka and Enugu-Ukwu gullies and their disastrous impacts are well known. In all the erosion and flood threatened areas in the state the stories are the same. It is mayhem, nightmare and uproar everywhere! Horror, deaths, maiming or crippling of people through gully-falls, loss of buildings and land etc. are common place! The story of disasters in one community is a mirror-image of the other. More effective and newer strategies for control, stronger will power, and more financial resources are of the essence.

References

- Anambra State Government (1994) *The Raving war!-Erosion, Gullies and Landslides Ravage Anambra State*, Awka. God's Time Printing and Publishing.
- Onwuka, S.U (2008) "Urban Erosion Problems" in Nnodu, V.C; Okoye, C.O and Onwuka, S.U (eds), *Urban Environmental Problems in Nigeria*, Nimo-Awka.Rex Charles and Patrick Publications.
- Okoye, C.O (2005) "Map Work 1" in Ofoma, J.C and Nnodu, V.C (eds), *Fundamental of Geography*, Awka. Chivicson ventures.
- Onwuka, S.U; Nnodu, V.C and Okoye, C.O (2009) "Tackling Soil Erosion Problem in Anambra State through Attitudinal Change: A Review. In *Developing Friendly and Sustainable Environment: The GlobalChallenge*. Proceeding of the 16th Annual National Conference of the Environment and Behavior Association of Nigeria (EBAN) held at Nnamdi Azikiwe University, Awka, between 12th and 13th November, 2009.

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