IMPLICATION OF SOIL EROSION TO PHYSICAL DEVELOPMENT.

CASE STUDY OF LAFIA TOWN NASARAWA STATE CAPITAL.

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Normal geological erosion is widespread where there is a flow of energy and matter on the earth surface and accelerated soil erosion is associated will mans activities, that is, it is man induces erosion.

This man-induced erosion is the type that attracts more soil erosion is one major hazard that causes several untold hardship to mankind. The phenomenon has over the years attracted the attention of environmentalist, physical developers, the government of many nations as well as the public.

In Nigeria a lot of properties are lost in different parts of the country annually due to soil erosion. The colossal loss which is difficult to quantity affect individuals, communities and the nation at large.

Nasarawa State in the middle belt of the country is one of the worst affected areas. In fact some of the erosion sites are not conspicuous that they do not only attract international attention but serve as tourist attraction areas.

Lafia in Nasarawa State which is the case study is a good example of towns experiencing annual erosion menace. This study is therefore intended to analyse the real issues involved in the erosion problem in the area so as to proffer remedies to them and hence promise the development of the town and the young state in general.

1.3 STATEMENT OF PROBLEMS.

The major problem which soil erosion creates in Nassarawa State is degradation of the general landscape. This is responsible for the numerous

country. The trunk 'A; road emanating from the town links Shendam and nearby Local Government. The people of Lafia are predominantly civil servants and the town is a commercial centre.

1.7 NASSARAWA STATE AT NATIONAL SETTING.

Nassarawa State is one of the 36 States of the Federal Republic of Nigeria. It derives its name from the geographical landscape that predominates the area. Nassarawa State is made up of undulating lowlands of average height of 2,737 square Km above sea level. Nassarawa State is flanked by six of the 36 (thirty six) States including Abuja, the Federal Capital Territory. Niger, Plateau State are bounded to the north-west. It is bounded to the south by Benue State, to the North-east is Plateau State. It has thirteen (13) Local Government Aeas, viz, Wamba, Lafia, Awe, Keana. Akwanga, toto, Nasarawa, Keffi, Obi, Kokona, Karu, Nasarawa Eggon and Doma.

The state is located almost at the centre of the country between latitude 7^0 and 11^0 North, and longitude 7^0 and 25^0 East and occupies an area of about $53,585Km^2$.

Nasarawa State being in lower part of the country, is the geographical and hydrographical centre of Nigeria forming central water divided from the descent in a series of steps to the wide Benue trough. The area is dated by rocks and also broken by V-shape river valleys.

1.8 LOCATION AND GEOGRAPHICAL SETTING OF LAFIA.

Lafia town is situated in the fertile agricultural area, and produces qualities of essential food commodities such as Rice, Yam, G/corn, Maize, Millet, Groundnut, Cassava, Beans, etc.

Lafia Local government is bounded by Nasarawa Eggon Local Government Council in the North, bounded by Benue State in the eat and bounded in the south by Doma Local Government Council.

Apart from available infrastructures such as accessibility of road network, electricity, pipe born water supply, Banks and many others, there are also industrial establishments, small scale and cottage industries. There are three (3) Secondary Schools, three Vocational Schools, ten (10 Primary Schools, One School of Agriculture, Federal Polytechnic, Nasarawa (Lafia Campus) and others. Lafia has four districts, namely, Lafian Assakio, Barkin Abdullahi, and Agyaragu, with an area of 7,155 km and population of 360,865 people.

This from all indications, it was quite evident that Lafia Local Government Area is large enough to support different types of small scale industries engaged by her inhabitants.

1.9 TOPOGRAPHY.

Lafia being lower part of the state is the geographical centre of Nigeria, farming a central water divide.

Rainfall: The internity of rainfall in an area determines the rate of run off and absorption of rain water.

Areas characterised by torrential rainfall experience high rate of run off which if un-channeled devastates the physical environment by removing the soil surface through the aid of other physical factors such as topography, soil, etc.

Natural of Terrain: The topography of an area determines the speed of run off in the area undulating terrain accelerates run off unlike flat terrain. However, the rate of erosion on any terrrain is determined by nature of the prevailing rocks and soil texture of the area. For instance, Enugu State is gentle but the nature of the soil is responsible for high rate of erosion in the area unlike Ekiti slope which is steep but the nature of the rocks present in the area reduces the erosion effects on earth surface in the area.

Vegetal Cover: Vegetal coer in an area determines the extent of protections of the soil surface in the area. An area with sparse vegetation is more prone to erosion because the soil surface is directly exposed to the agents of erosion such as wind and rainfall.

2.2 HUMAN AND ANIMAL FACTORS.

Human Factors: Human activities such as intensive construction, wrong cultivation practices, poor location of footpaths, indiscriminate destruction of vegetal cover and intensive development expose the soil surface to erosion hazards or weaken the compactness of the soil as in the case of vibration, thereby making it liable to erosion menace.

5) High velocity of winds

6) Smallness of the size of soil particles.

This agent is responsible for the land forms in the desert e.g. gour in the Sahara, Yardangs in the interior deserts of Central Asia, Mesas and Butes of Eastern Mauritania, etc. It is also responsible for land form of wind depositions in desert. Fr instance, the sand dunes and brackens of Sahara and West Australian deserts.

2.3.4 THE WORK OF MOVING ICE.

Moving Ice otherwise known as placation is the most powerful of the erosion agents though not very common like running water agent. Glaciation generally gives rise to erosional features on the low lands. Though these processes are not mutually exclusive because a glacier plays a combined role of erosion transportation and deposition through its course. Its action is by plucking and abrasion. The effect of this agent is experienced in Switzerland. However, the action of ice as an agent of denudation is not common in tropical countries like Nigeria.

2.3.5 THE WORK OF UNDERGROUND WATER.

Under the ground at depth which vary with circumstances, ground water is usually found. This level is called the water table Underground water plays role in land sculpturing in two important ways.

1) By feeding rivers from springs, it helps to maintain the flow of those rivers and so assists normal river erosion.

2) By work on the rocks below the surface, it is directly responsible for certain features on the surface.

2.4 THE PROCESS OF SOIL EROSION.

Soil erosion undergoes three stages which are as follows: early stage, middle or youth stage and old stage.

2.4.1 EARLY STAGE.

At this stage, individuals do not take notice of the erosion activities because the erosion is very mild and the action is vertical. That is, the nutrients of the soil are pushed downwards and where horizontal process occurs, it is not well noticed because the top soil is gently removed (sheet erosion).

Attention is not given at this stage because the erosion activities has not proved itself a problem to the environment. From this stage, further stages develop which might attract attention depending on its location.

2.4.2 MIDDLE STAGE.

This is the stage at which the presence of solid erosion is noticed. At this stage, roots of grasses are exposed, movement of the rain run-off is noticed and awareness is created. This awareness does not make any difference to individuals because attention is not given to the activities of the erosion until the old stage is approaching or has fully set in.

2.4.3 OLD STAGE.

At this stage the soil erosion has become a menace. The rule produced has grown into deep gullies, the form lands become heavily affected culvery and bridges

are removed, drainage system are covered with eroded materials and run off concentrates in particular spots (flooding developed) causing environmental hazards.

At this stage, individuals become aware of the menace but control measure are more difficult and much fund will be required in the control and prevention for further damage.

All these stages constitute environmental problems and prone difficulties to physical development if not controlled.

2.5 EFFECTS OF SOIL EROSION.

Soil erosion as a universal phenomenon has effects which are either positive or negative. Through most positive effects of soil erosion has a major negative effect on environment but the fact that they attract some positive interest, they could be said to be positive effects.

2.5.1 POSITIVE EFFECTS OF THE SOIL.

Among the positive effect of soil erosion activities are the emergence of spring water, tourism centre, provision of sand for construction purpose increase fertility of the soil etc.

i. **Tourism Centre:** Areas affected by soil form some of the major tourism centre of the world. Example of these are the badlands of Dakota in USA, Batu caves in Kuala Lumpur, Carls Bad cave in New Mexico, U.S.A. ad Postujua caves in Yugoslavia.

ii. **Spring Water**: Spring water which develops as a result of soil erosion feeds streams and rivers thereby increasing water volume for human usage.

iii. **Provision of Sand**: Sand which is used for construction purposes are as a result of soil erosion. For example beaches of seas and rivers suppliers sand and gravel are by products of erosion of the shore lines.

iv. **Increased Soil Fertility:** The fine dust blown beyond the desert limits is deposited on neighbouring lands as loess is found in Northern China in the loess Plateau of the Hwang Ho basin (Goh 1981).

2.5.2 NEGATIVE EFFECTS OF SOIL EROSION.

Soil erosion is the same age with the world but it rates increase as populaiton and development of the world increases. As a matter of fact, men have made several efforts in the control of soil erosion which if not, may be the whole world could have been washed into sea by now. Among the various measure employed in the control soil erosion in the world are re-establishment of a vegetation cover and conservation of the vegetation and also reclamation of the top soil.

This measure suffers the problem of insatiably by plants because soil is impoverished or absent.

In addition sudden rainstorms may result in the vegetation being washed away before it has had a chance to fixed the soil with its roots. In Nasarawa State of Nigeria, where there is problem of gully erosion, vegetation such as cashew plants has been planted in affected and susceptible areas to check and prevent its occurrence.

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2.8 GOVERNEMNT POLICIES ON SOIL EROSION IN NIGERIA.

Environmental issues and problem are by their very nature complex. The ramification and the urgency that then demand are such that they are or should be the concern of all individuals and all levels of government. This is because environmental threats often are not limited only to one community or region. Rather, they affect the whole regions and in many cases the entire earth.

Therefore, there is need to reach agreement on common concerns and actions at both the national and international levels. Though environmental protection and conservation which define a different relationship with nature and natural forces are often not in harmony wit progress and economic growth as perceived by governments. The government policy on soil erosion is embodies in the national development plans.

2.8.1 FIRST AND SECOND NATIONAL DEVELOPMENT PLAN: 1962 - 68 AND 1970 - 74.

These plans contained serious inadequacies with regard to planning for sustainable development. Environmental issues were not given any detailed separate analysis or treatment in their won right. The policy on soil erosion emerged as essentially welfare and social services issues, as by products of planning for agriculture, forestry deficiencies in the provision of water prevention of soil erosion, overgrazing etc, they were often couched in purely welfarist public health or economic development.

2.8.2 THE THIRD NATIONAL DEVELOPMENT PLAN: 1975 - 80.

The plan confronted environment issues in its discussion of irrigation, soil conservation, anti drought measures and the importance of landuse surveys. Further discussions focused on the problem of forest resources, under which programmes of forest plantation development, forest regeneration and protection. Forestry were enumerated, protective forestry emerged specifically as a conservation issue as the physical environment in the aride zone by planting trees on farmlands in villages and along public highways as shelter belts.

2.8.3 THE FOURTH NATIONAL DEVELOPMENT PLAN: 1981 - 85.

In this plan, there was a return to the position in the sceond plan; which put most of the environmental and regional development issues under the social sector. However, in advance on the third pan was that environmental planning and

National Council on Environmental and promulgation of Federal Environmental Policy in 1989.

In 1985 and 1986 the Federal Ministry of Science and Technology organised two major conferences on ecological disasters. The outcome of the conference was the publication of two books, one on drought and desertification and desertification and the other on soil erosion.

In 1994 the Federal Government set up a task force on soil erosion control in virtually all the states of the country but their activity has been that of electing officials and not other issue on soil erosion has not far been discussed by the task force till date.

Delay in tarring of graded roads has exposed and worsened the soil surface and particles for erosion agent.

Furthermore, people excavate sand from road sides for construction purposes. This action helps the soil erosion to be more active especially where the sand is being eroded from.

Owing to lack of land for expansion, many developers have encroached on to the right of ways in the town thereby making it difficult to construct drainages. This action influencing flooding.

Another human activity that influences soil erosion in Lafia is the farming system. From observation, people cultivate their lands to the road sides leaving little or no grand cover (vegetation) to control the run off from the roads as well as help in the infiltration of the soil.

4.3 SURVEY OF PHYSICAL DEVELOPMENT RAVAGED BY SOIL EROSION

4.3.1 ROADS AND DRAINAGE SYSTEM

It was observed that virtually all the roads in Lafia are threatened by erosion and flooding. However, the severity vary from one road to the other. For instances the Jos Makurdi road which pass through the town is presently in good condition. That is the effect of erosion on it is less noticeable. This may be due to durability of the materials used in their construction as well as the good drainage system provided along the road sides, whereas some cannot be said of other roads

4.4.2 EXTERNAL BODIES EFFORT

As highlighted earlier, soil erosion in Nasarawa State has not only attracted national interest but also international recognition. The United Nation Development Programme (UNDP) is presently involved in the control of soil erosion in Nasarawa State. Some specific areous have been marked out by UNDP for control of erosion.

4.5 SUMMARY OF FINDING

1. The major causatives of soil erosion in the area are ignorance of human activities, absence of drainage systems, lose soil texture, rugged terrain and high intensity of rainfall.
2. Most of the roads in the town are indeplorable condition because of incessant erosion activities.
3. It is observed that the physical environment of the area is generally poor (or unsightly).
4. The agency responsible for erosion control is not financially equipped to discharge its functions effectively.
5. Community and individual efforts in controlling soil erosion in the town is not encouraging.
6. Government plan son erosion control in Lafia has not been effective. As a matter of fact, there is no organised control measures by the government or the community as at the time of this study.

protect the environment against erosion menace and

6. Through the Ministry of Forestry embark on the provision of plants to control erosion and make available such plants to areas where they are needed.

5.1.2 RECOMMENDATION TO STATE GOVERNMENT

The state government on its past should be responsible for:

1. Actual disbursement of any fund made available for the control of soil erosion in the state.
2. The control of major erosion and flooding sites by direct involvement
3. Afforestation of the entire state and provision of the grasses and trees (seedlings) for such actions.
4. Incorporating village and town heads into control of erosion because it is through these heads that the grassroots or the masses should be actively involved.
5. Public enlightment in the state through the mass media on the needs to protect the environment and the past individual and community should play.
6. Enactment and enforcement of environmental protection laws.
7. The state government should control gully sites at their early and not when they are advanced.
8. The machinery for controlling soil erosion in the state should be

provided with adequate manpower and materials for more efficiency.

9. The state should consider and place among its priorities areas devasted by soil erosion such as Lafia in its policy.

10. The state government should extend the gesture of the external body to the control of erosion in Lafia.

5.1.3 RECOMMENDATION FOR COMMUNITY AND INDIVIDUAL EFFORTS

For more effective control of the soil erosion menace, the masses should be involved in the following areas:

1. Lafia community members should equally embark on afforestation problems

2. They should control erosional its early stage because a stich in time saves nine.

3. The traditional ruling body should discourage individuals from incessant deforestation, bush burning and unnecessary excavation of the land which tend to accelerate erosion problem. Defaulters should be made to pay a stipulated time.

4. Every member of the community should plant at least a cashier tree every year and about $3m^2$ of carpet grass annually.

5. The community should cooperate with the government to protect the environment by:

   a) Leaving not less than 5m distance between gully and

of soil erosion in Lafia. It is against this background that erosion control measures have been suggested in this project for Lafia town.

The responsibility for the control of erosion falls on the nation, state and the individual.

National responsibility involves the protection of societies interest in a natural resource of vital importance to the whole people. Government should properly discharge its responsibilities. Equally important is the interest of the individual in the protection of the land he owns from being washed away by erosive agents. National action may be aided by the government, but ultimately the soil must be largely conserved by those who till the land and live by its products.

Caution should also be exercised by individuals while embarking on physical development projects that could provoke soil erosion.

It is believed by this researcher that if the recommendations made in this report are fully adhered to the erosion menace currently ravaging the physical environment of Lafia would be a thing of the past.

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