

**MANAGEMENT OF SOIL EROSION AND
FLOOD IN NIGER SATE RIVERINE AREAS**

BY

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APPROVAL PAGE.

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DEDICATION

I have dedicated this project work to Almighty Allahu subuhanawu wata'ala who in his infinite mercy and blessings have made it possible for me to successfully complete this programme. The project is also dedicated to all members of my family, parents, friends and well wishes for their tremendous support during the course of the programme.

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ABSTRACT.

Soil erosion and flood are the largest contributors of environmental degradation of disaster magnitude in Niger State, particularly the riverine areas. These areas are characterized by high demographic pressure coupled with uneven terrain truncated by slopes on very loose and fragile soils. An important aspect of this environmental degradation is the identification of causative factors which will indicate the preventive and / or remedial measures to its presence. Nigeria's experiences on erosion and flood are revealed on two main factors namely natural and man-made-causes. Topography (relief), soil, vegetation and hydrometeorology are natural parameters that cause soil erosion and flood while human contribution ranges in the area of ignorance; agriculture, infrastructure development and demography. Most often, causative factors act conjunctively by in various combinations and degrees to occasion and / or exacerbate erosion and flood occurrence. Also while localized consideration may single out erosion or flood, it is the usual experience to have erosion and flood occurring in same vicinity year in year out either on an open field, and / or villages that are by the river sides, arising from upstream-downstream influence. Thus to achieve effectiveness and sustainability of solution measures, be it preventive or curative would be improved by adopting global view of the causative factors as well as recognition of erosion interplay of erosion and flood.

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CHAPTER ONE

1. INTRODUCTION

1.1 BACKGROUND OF THE STUDY.

The soil and water resources constitute very vital component of the natural resource base of any nation. They are natural resources that are irreplaceable. It is on these resources that our food crops, animal production and almost all socio-economic infrastructures are built. In fact, life cannot exist in the absence of any of these resources.

Nigeria has a total land area of 92,377,000 hectare (Duze and Ojo, 1977) of which 26% is arable. Major rivers in Nigeria have a total length of 8,051 kilometers with a surface area of 1,300,000 hectares (Duze & Ojo, 1977). It is also revealed that Nigeria has about 160 dams that are either constructed, or under construction and their total active reservoir capacity amount to 30700mcm, which are designed for uses in irrigation, water supply and hydropower. It is on record that major dams in Nigeria are located within Niger State namely Kainji, Jebba and Shiroro. Therefore the annual experience of erosion and flood is inevitable, so there is need for the state to focus its attention on how properly these natural resources can be harnessed without causing environmental degradation to its populace.

1.2 WHAT IS SOIL EROSION?

Soil erosion is a geomorphological process through which the surface layer of weathered rock is detached and transported away by either the wind or moving water with the resultant deposition of such materials being moved by land overflow water from the detachment point to an even area in a watershed.

In most cases, soil erosion is slow where there are no human activities and it is accelerated with the presence of human activities.

Broadly, soil erosion is categorized into two, namely; Geologic Erosion and Accelerated Erosion.

1:2:1 GEOLOGIC EROSION:- This is the type of erosion that is occurring naturally from the forces inherent in the formation of landscape and river movement. It exists in a natural land that has not being worked upon by man activities. It causes no disaster to the environment.

1:2:2 ACCELERATED EROSION: - In an undisturbed natural ecosystem, there is equilibrium between the members of the ecosystem. The soil usually protected by plant canopy cover, which in turn shed leaves that form a thick mat of protective cover over the surface of the earth.

Unfortunately, the entry of man, such ecosystem starts to unbalance.

Trees are usually removed for the land to be used either

for food production or the provision of other socio-economic amenities such as schools, markets, recreational gardens, road, houses, burial grounds, parks and construction of dams e.t.c. These various land uses lead to increase activity of run-off water. Consequently, soil are washed and carried away.

In that case, erosion is accelerated from its usual natural geologic non-virulent form to the more devastating form it manifests today.

1.3 FLOOD

Flood can be defined as the over flood of water from dams or river-banks. The excesses of flood causes environmental degradation therefore render it a problem for the communities concern.

1.3.1 TYPES OF FLOOD

Floods are of various types namely.

A. Coastal flood:- This is the type of flood that occurs at the coast of the rivers and it is cause by different actions.

They are:

- b. Flood due to rainfall
- c. Flood due to dam breaks
- d. River flood
- e. Flood due to snow melt
- f. Glacial flood
- g. Flood due to ice movement

1.4 OBJECTIVE OF THE STUDY

The objective of this project is to identify causes of soil erosion and flood devastation in Niger State riverine areas and proffer solution to them by suggesting ways and means of eliminating this unfriendly havoc to the state.

1.5 SCOPE OF THE STUDY

This project is going to limits its area of coverage to some causes, effects, efforts of the government so far and suggest solutions in a way of trying to reduce the consequences of these natural / man-made disaster on the riverine populace in Niger State.

CHAPTER TWO

2.0 LITERATURE REVIEW

In the last decades the problem of erosion and flood in Niger State has become a series environmental threat as so many villages, around the riverine area are given to erosion and flood.

It has been estimated that over 50 communities in Niger State were overtaken by flood from erosion of highway splits and over flow of dams and strength of erosion disaster. (Resettlement Unit of SSG office reports 99). Year in year out, the same situation takes on its toll on the society and has become a regular recurring feature in some towns and rural communities particularly the riverine areas of the state.

In all part of the state, particularly Shiroro, Borgu and Mokwa Local Government areas it is estimated that when the rain comes at least a hectare of land experiences this degradation at every minutes (Disaster relief agency report 1998). The abandoned of caution and the destructive effect of erosion and flood on communities have reached an alarming dimension.

Ecosystem relief funds set aside by the federal and State Governments are hardly enough to cope with the dimension of the problems caused

by erosion and flood. However, national campaign on preventive measures against erosion might save funds.

The real problem in the last twenty years lies in the identification of a definite point where preventive measure should start. Large sums of money that are diverted in fighting the devastation of erosion and flood every year and season could be meaningfully spent in poverty alleviation and raising of the standard of living of individuals particularly the affected areas.

A cost analysis of erosion and flood disaster in Niger State between 1994 to 2001 indicates that billions of Naira went in to erosion control and relief materials which include the construction of permanent and semi-permanent accommodation for victims of the disaster left many people homeless and properties worth millions of Naira were lost.

The State Government has establish resettlement programme headed by a powerful personnel in the government. They have their offices in the affected Local Government Areas and are directly under the state governor himself, yet in the same state, spirited efforts are made to move on and on, on effort that puts the state in the position of a pendulum that constantly swings back and fronts.

2.1 WHY DOES EROSION OCCUR

As earlier discussed while introducing erosion and its forms and types of erosion and flood.

It is even observable that where man had not defoliated the environment, the differences being that there could be equilibrium in a natural ecosystem. For example, over many years past when there was equilibrium between man and his environment i.e. the land surface is not exposed to agents of erosion and flood.

There was not used to be severe erosion as prevalent today (erosion research center federal University of Technology Owerri 1991).

One of the reasons was that land was not used for agriculture, as there were less demand on the land as well as there was less demographic pressure. The advent of development and its attendant attractions on massive and hurried urbanization have led to unproportionate demand on the land. Social infrastructures are constantly being put in place. In most riverine areas of the state dredging valleys and water by a way of sand excavation has been a construction of highways and erection of culverts indiscriminately by local governments. Reasons being that political consideration often overrides scientific professional consideration.

2.2 EFFECT OF EROSION AND FLOOD

Erosion and flood causes devastation of the environment. Big gullies and over flow dams develop all over the state especially the Riverine areas.

Statistic have shown that over 70% percent of the nation's population depend directly on land for subsistence, and where this life supporting commodity is under threat, little doubt exist that its tremour would be felt in all sector of the economy (a non-Techno-Economies survey of sokoto 1981). As a direct consequences of the devastation due to erosion and flood, many families are often forced to move from their homes, a situation of forced migration and or forced relocation which may create negative and lasting impression on the victims.

2.3 EFFECT OF EROSION AND FLOOD ON THE ENVIRONMENT

The occurrences of any of these activities cause devastation of the affected environment. Farm lands, towns and villages are ravaged by the actions of erosion and flood thereby making the environment unsightly and unsafe. Houses and settlements are washed away (C.A Lori flood Erosion control F.M.W & H. 1999).

2.4 EFFECT OF EROSION AND FLOOD ON ECONOMY

Erosion and flood does not only deface farmland and structures.

Farm yield is diminished as a result of poor fertility of the soil with a resultant low income to the farmers.

Apart from the washing of the farmland a large sum of money are spent every season by the Government in a bid of providing relief materials and relocation of the victims of devastation thereby having negative impact on the state budget.

2.5 EROSION AND FLOOD INDUCED AGRICULTURE OF RURAL POVERTY

It is evident that agriculture is a dominant source of income and employment of Nigeria's rural population and that land is the bedrock of that agriculture (FGN 1987) the country is very rich but people particularly the rural people are very poor. A drastic erosion or flood induce so many things ranging from washing away of the productive portion of the land to destruction of lives and properties. And these not only reduces the quality and quantity of their agricultural production but also reduces their income capacity, consequently further reduces their purchasing power and access to local needs of rural life such as food and shelter.

A recent World Bank report on poverty assessment in Nigeria (1996)

and the report of vision 2010 committee (1997) Separately Lament in unison of the low income capacity of the country's rural populace. The lowering of rural income capacity is reflective of the overall rural economic performance seriously caused by the dangers of erosion and flood (Fubara M.J.D 1988).

2.6 PROBLEM OF EROSION AND FLOOD CONTROL

1. **COMPLACENCY:-** The process of erosion and flood is somewhat gradual and invisible to most people. Most people notice the effect of these hazards when it occurs or when a large portion of soil have be washed away such people are complacent about erosion and flood process (Ofomaka G.E.K uses and misuse of agricultural land 1982).
2. **LACK OF FUNDING:-** The erosion and flood control programmes hardly had enough funding for their programmes thereby render the aims and objectives of the programmes not effective and nor meeting its obligation (Gowon D.T. 1983).
3. **DIFFICULTY IN IMPLEMENTATION:-** Most land users do not cultivate the habit of erosion and flood control measures like a religion. As with most religion it is more easily preached then practiced (D.T. Gowon 1983).

4. **LACK OF INCENTIVES:** - A good number of farmers have basic commitment to good stewardship to the land they till, it is however hard to blame them for not investing in conservation practices that do not "seen to pay" a reasonable return on the investment (Gowon D.T. 1983).

2.7 DIRECT CAUSES:-

Toward evolving remedial measures some direct causative factor were identified

- (a) Most townships of riverine areas have inadequate drainage system and where they exist they are not proper or maintain at all.
- (b) Roadways within these areas are on the high elevation making it easier for run-off to take its course.
- (c) At Gbajibo in Mokwa Local Government FisherMen settle along the river that flows from Jebba Dam and any slight open of gate result to flood disaster.

CHAPTER THREE

3.0 QUESTIONNAIRE

Sample question were used in Muregi, Guzdan, Shiroro, Gbajibo and their answer were synonymous because they have the same problems.

This questions thus:

1. What is erosion?
2. What is flood?
3. What is the difference between erosion and flood?
4. What is the effect of flood?
5. What is the effect of erosion?
6. How do you control flood?
7. How do you control erosion?
8. What are the possible ways of managing erosion?
9. What are the possible ways of managing flood?
10. What are the causes of flood and erosion in riverine areas e.g Muregi?
11. How frequent does flood and erosion occur in your areas?
12. Do you record any loss of crops, farm animals and properties?
13. Do you attempts to control erosion and flood using your own resources?
14. Does Government come-in to assist you?
15. How does the Government come in?

16. How does the community assist in solving the problems?
17. What is the effect of erosion and flood in the riverine areas?
18. How does it affect the economy of the area?
19. At what period do you experience erosion and flood?
20. What are other possible ways of erosion and flood can you suggest?

Thank you.

From response received in the above questionnaire, we are able to come out with the findings that will reduce the occurrence of erosion and flood in the area under study.

CHAPTER FOUR

4.0 FINDINGS

This project work suggests various ways and method by which the perennial incident may be eliminated within the society.

4.1 WATERSHED APPROACH

A watershed is a small area of land that drains into a single waterway or body of water. A small watershed of few kilometers drains to large rivers thereby reducing the rate of surface run-off and combating the creation of gullies.

In fact, experience has provide it that of all the units possible of containing a conservation project, villages, state and provinces the only natural project area is that of a watershed.

It is natural because it allows planners to focus on all the effects of downhill run-off in a given area and to plan accordingly to control or contain it.

As a rule watershed development requires the combinations of many disciplines and aims at improving the quality of life of local residents of the area as well as management of resources.

Emphasis should be place on replicable simple Biotechnical approach such as

- Soil cover management
- The effect of machinery on the lawn
- The zero tillage approach
- Crop rotation
- Bundling and waterworks / small dams
- Control ridging / terracing; and it is usually profitable and results oriented if the programme commence at the advent of raining season as the knowledge gain will be immediately utilized.

The programme requires the service of extension worker because of the constant teaching and supervision.

4.4 INCENTIVES EXTENSION

As earlier mention people are encouraged by way of materials quantifiable incentives such as improve cultivars and fertilizer to transfer what ever is shown to them on the demo-plot to their various land.

However, to assure incentive to meant for only those that agrees to practice soil conservation involves arduous and drudgery tasks.

- Provision of land for demonstration in each watershed required provision of auxiliary staff on soil conservation.

It has been proved that it will cost the local government less ₦300.000 in preventive measures is aimed at checking the occurrence of erosion and flood. So it is most appropriate and it is advised that the state should embark on this programme.

4.6 ADEQUATE PROJECT PLANNING

It is advisable that before embarking in any infrastructure construction there would be inadequate planning.

The planing should take into consideration the adverse effect of the construction in relation to others and also to generality of the people, political consideration should be kept aside when planning any infrastructural construction.

4.7 PROPER PROJECT DESIGN

After ensuring adequate planning project should be design by experts. By so doing the infrastructure will be structurally sound and eliminate the risks of failure. Failures of dams have been identified as one of the major causes of erosion and flood.

4.8 ELIMINATION OF DEFECTIVE CONSTRUCTION

Contracts for the construction of dams and infrastructure should be awarded to competent experience contractors in their field of

Brune proposed more refine relationship in 1953 for coarse, medium and fine sediments usual for determining reservoir segmentation.

Gill (4) presented a direct algebraic method, which correlated reservoir capacity with age of years.

The relationships developed are the following general for all sediments.

$$Co - C + (A/k) \ln (Co/C) = Gt/y \text{ -----(3)}$$

For coarse sediments.

$$Gt/y^1 = 0.994701 (Co-C) 1 = 0.006297 Ly (Co/C) - 0.3 \times 10^{-5} (1/Co - 1/c) \text{ -----(3)}$$

For medium sediments

$$Gt / y^i = 0.012LN (Co/c) + 102 (Co-C)/1 \text{ -----(4)}$$

$$-0.51 \times 10^{-6} (1/Co^2 - 12/C^2) \text{ -----(5)}$$

Where

Co = initial reservoirs capacity, cubic meters

C = reduced capacity of reservoir at any time to cubic meters.

iii. Bypassing sediments.

Method that employs the use of hydraulic structure include.

- Sediments flashing operation.
- Sediment slicing through specially designed reservoir operation policies.
- Release of density current.
- At the end of the above findings, I came up with the following recommendation in chapter V.

5. Management of soil erosion and flood conservation should be handled with every seriously to enable them perform effectively.
6. Concerned citizen and resource personal should be allowed to speak out their minds freely on the matter. Complaints, suggestion and enquiry should be directed to appropriate quarters and treated with dispatch.
7. There should be communal effort in managing erosion and flood.
8. There should be ready to accept government effort of village resettlement.
9. Farmer should be encourage to practice soil conservative techniques as a way of preventing soil erosion and flood

5.2 CONCLUSION

The degree of devastation attended by erosion and flood in the last twenty years is tremendous. The riverine people are to some extent aware of the man-made causes.

Evolving solution to problem posed to communities in riverine areas in Niger State by initially reporting annual flash flood lead to issued concerning different phenomenon of soil erosion and flood.

Identified direct causative factors causing flooding immediate solution should be profer.

Comprehensive considerations of direct causes of erosion and flood in the project location in conjunction with those remotely occasioned by

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