EFFECT OF CHANGING CLIMATE ON EROSION IN OKE-OYI DAM AGRICULTURAL WATERSHED, ILORIN, NIGERIA

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INTRODUCTION

- About 85% of land degradation is linked to soil erosion (Piccarreta *et al.*, 2006).
- There is paucity of information on soil loss in Nigeria
- Universal Soil Loss Equation (USLE) suits erosion estimation in Nigeria (Roose, 1977)
- Remote Sensing (RS) and ArcGIS techniques compliment USLE
- RS and ArcGIS make soil erosion estimation feasible in large areas
- Intensive agriculture predisposes the land to soil erosion
- Urbanization in Nigeria is leading to intensive agriculture
- hence the need to estimate and map soil erosion

MATERIALS AND METHODS

- The study site (Oke-oyi dam watershed) covers an area of 250ha (Plate 1)
- **Annual rainfall range from 1000 – 1500 mm**
- **25 years monthly precipitation data was used to derive rainfall erosivity (R)**
- **Calculation of Soil loss (A) was by RUSLE in GIS environment and**
- **ArcGis map algebra raster calculator tool**
- **Primary and secondary data sources were used to compute 'A'(Fig.1)**
- Soil loss (A) was computed as:

A= (R*K*LS*C*P) ..... **(1)**

Where A = mean annual soil loss (t ha^{-1} y^{-1});
R = rainfall erosivity factor (MJ mm h^{-1} ha^{-1} y^{-1});
K= soil erodibility factor (t ha^{-1} MJ^{-1} mm^{-1});
LS= topographic factor (slope length and steepness) (dimensionless);
C = cover management factor (dimensionless); and
P = erosion support practice or land management factor (dimensionless).

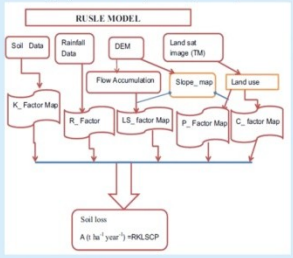

Figure 1: Flow Chart of the Study

Plate 1: Google Earth Image of Oke-Oyi Dam Watershed

RESULTS

- Mean total rainfall increased by 50%(1997 – 2001 to 2012 – 2017)
- Mean total rainfall is projected to increase by 24 % (2018 - 2027)
- Rainfall erosivity was estimated to be 83.43 MJ mm/ha/y
- erosivity of rainfall increased by 19 % (1997 – 2001 to 2012 – 2017)
- erosivity will increase by 12 % in the next decade (broken linesFig. 2)
- Erodibility of about 50 % of soils of the watershed was high (Fig.3)
- Soils on strong to very strong slope occupy about 14 % of the area (Fig.4)
- About 97 % of the study area was under light vegetation (Fig.5)
- Contouring was observed as the erosion control practice in the area
- Contouring on the slope of the area has a P value range 0.55 to 1(Fig.6)
- Annual soil loss ranged from 0 – 1272 t/ha/y in the area (Fig. 7)
- Mean annual soil loss of the watershed is about 40.02 t/ha/y
- Total annual soil loss from the area is about 30,000 t/ha/y
- Erosion hotspot were in areas with high erodibility, light vegetation and strong slope

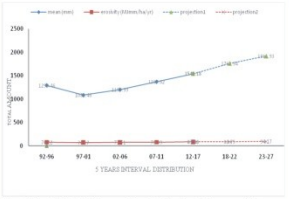

Figure 2: Mean Total Rainfall Amount and Erosivity of the Oke – Oyi Dam watershed

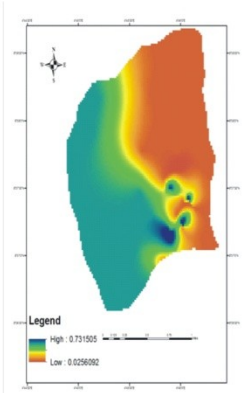

Fig.3 Soil erodibility map of Oke-oyi dam watershed

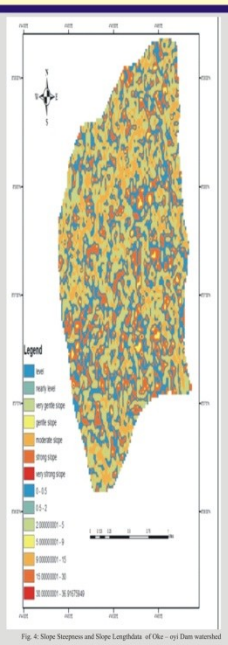

Fig. 4: Slope Steepness and Slope Lengthdata of Oke – oyi Dam watershed

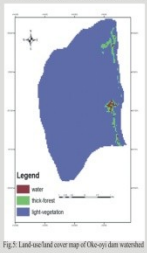

Fig.5: Land-use/land cover map of Oke-oyi dam watershed

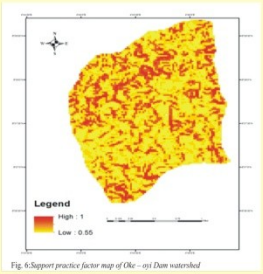

Fig. 6:*Support practice factor map of Oke – oyi Dam watershed*

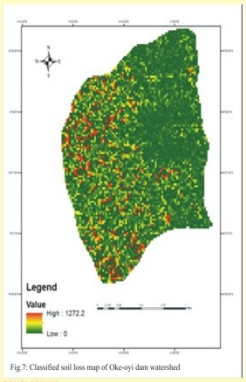

Fig.7: Classified soil loss map of Oke-oyi dam watershed

CONCLUSSION

- Erosivity of Oke-oyi dam watershed is increasing
- The major contributors to soil loss are:
  High soil erodibility, poor vegetation cover,unfavourable topography and inappropriate support practice
- Terracing and strip cropping will reduce soil loss and is therefore advocated for sustainable crop production.

REFERENCES

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Roose, E.J.1977. *Use of USLE to Predict Soil Erosion in West Africa*.Special Publication.*Soil Conservation Society America*, Ankeny, IOWA, 21: 60-74.