Current Journal of Engineering and Science Research
Volume 3, Issue 8, pp 19-30, August 2026
ISSN (online): 3049-1738
DOI: https://doi.org/10.47001/CJESR/2026.308003
Available Online at https://www.cjesr.com

Assessment of Soil Erosion Potential in Lagelu Local Government Area, Oyo State Nigeria

[1]Adamu Ismaila, [2]Adebayo Gbenga Ojo, [3]Olaniran Emmanuel Aluka, [4]Olakunle Rufus Oladosu, [5]Seyi Festus Olatoyinbo, [6]Abu Shuaibu, [7]Isaac Utenwojo Ocholi, [8]Oluwabunmi Fasote, [9]Oyetoro Gbenga Gideon, [10]*Maha Alih

[1-10]Center for Space Life Science (National Space Research and Development Agency) University of Ibadan, Oyo State, Nigeria
*Corresponding Author's E-mail: alihmaha@gmail.com

Abstract: Soil erosion is a critical environmental issue that affects soil fertility, agricultural productivity, and ecosystem stability, particularly in developing regions. This study assesses soil erosion susceptibility in Lagelu, Oyo State Southwestern Nigeria, using an integrated approach that combines topographic, climatic, and soil-related factors within a Geographic Information System (GIS) environment. The major factors considered include slope, rainfall, land use/land cover, soil texture, and soil organic matter. Slope gradient was derived from ASTER Digital Elevation Model (DEM), while land use/land cover classification was obtained from Landsat 8 imagery. Soil texture (sand, silt, and clay fractions) and organic matter content were analysed to evaluate soil resistance to erosion, and rainfall data were used to determine the precipitation. The Analytical Hierarchy Process (AHP) was employed to assign weights to these factors, and a weighted overlay analysis was conducted to produce an erosion hazard map. The results reveal that areas with steep slopes, high rainfall intensity, sparse vegetation cover, and high sand content are more vulnerable to erosion, whereas soils with higher clay, silt, and organic matter content exhibit greater stability. The erosion susceptibility map indicates that 19% of the area falls within low risk, 76% within moderate risk, and 5% within high-risk zones. The predominance of moderate-risk areas suggests widespread exposure to erosion processes across the region. The study highlights the combined influence of natural and anthropogenic factors on soil erosion and provides a scientific basis for implementing effective soil conservation measures, land use planning, and environmental management strategies in the study area.

Keywords: Soil erosion, GIS and remote sensing, Analytical Hierarchy Process, Land degradation, Lagelu.

I. INTRODUCTION

Soil is a fundamental natural resource that underpins terrestrial ecosystems, agricultural productivity, and human development (Okin, 2005; Iliyasu *et al.*, 2019). However, soil degradation-particularly through erosion-has become a critical global environmental challenge, with significant implications for food security, water quality, and land sustainability (Ananda and Herath, 2003). It is estimated that approximately 75 billion tons of soil are lost annually due to erosion, contributing to the degradation of nearly 40% of the world's agricultural land (FAO, 2003). This process involves the detachment, transport, and deposition of soil particles by agents such as water, wind, and human activities, and is strongly influenced by both natural conditions and anthropogenic pressures (Onwuka, 2008; Egboka, 2003).

In Nigeria, soil erosion represents a major environmental problem, particularly in regions characterized by intense rainfall, fragile soils, and rapid land use change. The impacts are multifaceted, including loss of arable land, declining soil fertility, sedimentation of water bodies, reduced agricultural productivity, and socio-economic consequences such as loss of livelihoods and increased vulnerability to poverty (Sanchez, 2002; Anderson, 2010; FAO, 2015; Blaikie, 2016; UNEP, 2019; Umesh *et al*, 2022). In southwestern Nigeria, these challenges are further exacerbated by rapid population growth, unplanned urban expansion, deforestation, and unsustainable agricultural practices, all of which increase landscape susceptibility to erosion (Federal Ministry of Environment, 2018; World Bank, 2020).

Lagelu Local Government Area, located in Ibadan, Oyo State, exemplifies these dynamics. The area is characterized by a

Current Journal of Engineering and Science Research
Volume 3, Issue 8, pp 19-30, August 2026
ISSN (online): 3049-1738
DOI: https://doi.org/10.47001/CJESR/2026.308003
Available Online at https://www.cjesr.com

humid tropical climate with seasonal high-intensity rainfall, heterogeneous land use patterns, and varying topographic conditions ranging from gently undulating surfaces to steeper slopes. Increasing anthropogenic activities, including vegetation clearance and infrastructural development, have intensified soil erosion processes, leading to the formation of rills and gullies, as well as sediment accumulation in drainage channels (Oyo State Government, 2021; Nigerian Meteorological Agency, 2022). Despite these observable impacts, there remains a lack of comprehensive, spatially explicit assessments of erosion susceptibility in the area, limiting effective land management and policy interventions

Traditional methods of soil erosion assessment, including field-based observations and single-model approaches such as the Revised Universal Soil Loss Equation (RUSLE), provide valuable insights but often fail to capture the complex interactions among multiple controlling factors across space (Renard *et al.*, 1997; Morgan, 2005). Recent advances in geomatics technologies-including remote sensing, Geographic Information Systems (GIS), and spatial multi-criteria decision analysis-offer robust tools for integrating diverse datasets and analysing erosion processes at finer spatial scales (United States Geological Survey, 2016; National Aeronautics and Space Administration, 2020). In particular, the Analytical Hierarchy Process (AHP) has been widely applied to assign relative importance to erosion factors, enabling the development of more reliable erosion susceptibility models (Wischmeier & Smith, 1978; Borrelli *et al.*, 2017).

Against this background, this study adopts an integrated GIS-based multi-criteria evaluation approach to assess soil erosion susceptibility in Lagelu Local Government Area. The specific objectives are to: i) assess the factors responsible for soil erosion in the study area, (ii) generate soil erosion risk map. The outcomes of this study are expected to provide a scientific basis for targeted soil conservation strategies and sustainable land use planning, while contributing to the growing body of knowledge on erosion risk assessment in data-constrained tropical environments.

II. MATERIALS AND METHODS

2.1 Study Area

Lagelu Local Government area lies within the latitude 7025'0''N and 7035'0''N and longitude 30 55'0''E and 4010'0''E (Fig. 1). It covers 416sqkm with it's headquarter at Iyana Offa. The Local Government consists of two local council development areas namely Lagelu West and Lagelu North. The Climate is equatorial, notably with dry and wet seasons with relatively high humidity. The dry season lasts from November to March while most of the rainfall is concentrated between April and October (Adekoya *et al.*, 2000; Oyebande and Oguntoyinbo, 1970). The mean annual rainfall for the area ranges from 1000 mm to 1400 mm, average daily temperature ranges between 25 °C and 35 °C and relative humidity ranges between 60 and 80 % (Adekoya *et al.*, 2000; Oyebande and Oguntoyinbo, 1970).

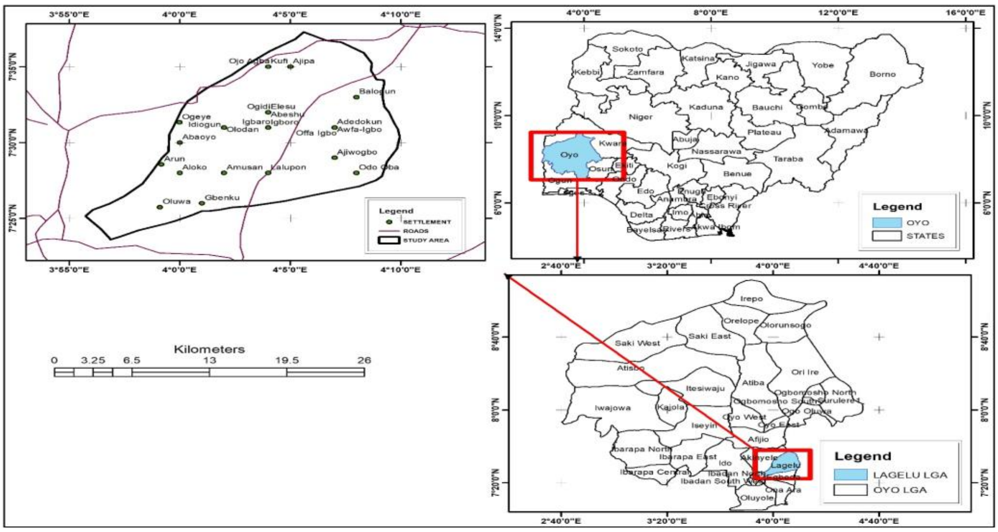

Figure 1: Study Area

Current Journal of Engineering and Science Research
Volume 3, Issue 8, pp 19-30, August 2026
ISSN (online): 3049-1738
DOI: https://doi.org/10.47001/CJESR/2026.308003
Available Online at https://www.cjesr.com

The rocks underlying the area are ancient crystalline Basement Complex formations which are generally acidic in composition (Rahaman, 1972; Oyawoye, 1967). The Basement Complex rocks consist mainly of gneiss, migmatite, schist, quartzite and marble but locally granite or syenite and intrusions of amphibolites and olivine rich dykes are found (Rahaman, 1972; Oyawoye, 1967). The soil is a very deep, moderately well drained, brownish sandy soil over loamy sand. Iron and manganese concretions are present at a depth of about 105 cm.

Agriculture is the main occupation of the people in the study area with cultivation of maize, cassava, millet, yam cowpea, rice, plantains, cocoa, palm produce and cashew. Other activities that people engaged in included trading, craftsmanship, artisanal, repair works and public service (Adekoya *et al.*, 2000).

2.2 Methodology

This study adopted both primary and secondary data. The primary data used includes the coordinates of all the erosion points and soil samples, while the secondary data includes Landsat 8 imagery, ASTER DEM and rainfall data. The coordinates of all the identified erosion locations were taken using the global positioning system. Soil samples were collected and analysed in the laboratory using standard analytical physical and chemical procedures to determine the soil texture and organic matter. The Landsat 8 imagery of year 2021 with path 190/row 055 was acquired from the United States Geological Survey (USGS) archive. The imagery was processed and bands 5-4-3 were combined, where band 5 represents the Near Infrared (0.845-0.885 µm), band 4 represents red (0.630-0.680 µm), and band 3 represents green (0.525-0.600µm). Supervised classification was carried out using the maximum likelihood classifier to get the different land cover classes of the study area.

The Advanced Space-borne Thermal Emission and Reflection Radiometer (ASTER) Digital Elevation Model (DEM) was used to generate the slope using the spatial analyst tools in ArcGIS 10.8. The precipitation map was derived from the rainfall data collected from NIMET using interpolation method known as Inverse Distance Weight algorithm in the GIS environment. The generated factors were reclassified and AHP method was applied in rating the selected factors and their classes. Accordingly, a decision matrix was formed on the basis of 1-9 scaling for parameters affecting a decision. The criteria in the scoring scale were as follows: (1) extremely unimportant, (2) very unimportant, (3) unimportant, (4) moderately unimportant, (5) equally important, (6) moderately important, (7) more important, (8) very important and (9) extremely important (Saaty, 2003; Çelik, 2019).

The basic steps for determining the system's normalized weight and consistency ratio (CR) were as follows:

Step 1: Establishment of judgment matrices (p) by pair-wise comparison

$$\text{Pair-wise comparison} = \begin{matrix} p11 & p12 & p1n \\ p21 & p22 & p2n \\ pn1 & pn2 & pnn \end{matrix} \text{ -------------- } (1)$$

Step 2: Calculation of normalized weight

$$\text{Wn} = \text{GMn}/\textstyle\sum_{n=1}^{N} \text{GMn} \text{---------------------------------- } (2)$$

Where W is weight vector (column) and GMn is the geometric mean of the ith row of the judgment.

Step 3: CR calculation to verify the coherence of the judgements:

$$\text{CR} = CI/RCL \text{----------------------------------- } (3)$$

Consistency index (CI) is denoted as follows:

$$\text{CI} = \frac{\lambda \max - N}{N-1} \text{ ------------------------------------- } (4)$$

Where λ is the Eigenvalue of judgment matrix and it is calculated as follows:

$$\lambda = \frac{\sum_{i=1}^{n}(PiW)n}{N*W} \text{ ----------------------------------- } (5)$$

The CR value had to be about 0.10 or less to be accepted.

However, all the weighted factors were overlay in the GIS environment using spatial analyst weighted overlay process to produce the erosion risk map of the area.

III. RESULTS AND DISCUSSION

3.1 Factors Responsible for Soil Erosion

The factors responsible for soil erosion in the study area are slope, precipitation/rainfall, land use land cover, soil texture (sand, clay and silt) and organic matter.

Current Journal of Engineering and Science Research
Volume 3, Issue 8, pp 19-30, August 2026
ISSN (online): 3049-1738
DOI: https://doi.org/10.47001/CJESR/2026.308003
Available Online at https://www.cjesr.com

3.1.1 Slope

Slope is one of the major factors determining how powerful runoff will be, and the runoff dynamic on a slope surface is determined by the slope gradient (Yao and Tang, 2001). Many studies have shown that slope surface runoff and soil loss increases as slope increases within a certain range (Liu and Jiang, 1994; Geng *et al*., 2010). When the slope is steep, run off increases rapidly with rainfall and as slope becomes increasingly steep, the effect of rainfall on slope runoff and soil loss becomes increasingly significant (Wang *et al*., 2018). The slope of the study area which ranges from 0°-89.999° (Figure 2). This was classified into three classes of 0° - 89.992°, 89.992° - 89.996°, 89.996° - 89.999°. Among the slope classes, the lowest range value 0° - 89.992° had the highest area coverage with 12055.3 Ha (45.5%), followed by 89.992°-89.996° with 9803.2 Ha (37%) area coverage, while the highest slope value 89.996° - 89.999° had the lowest area coverage with 4636.7 Ha (17.5%) (Table).

Locations found within the lowest slope value (0° - 89.992°) included Wofu-Olodo, Akoka, Adeyipo, Arikuyeri, Oriunbere and Olakoajo. Locations found within the highest slope value (89.996° - 89.999°) included Idiosan and Eni-Osa while Lalupon, Akubo, Akilapa and Alagbede were found within the slope value 89.992° - 89.996° (Figure 4). However, result showed that the slope value is directly proportional to erosion rate. This was corroborated by Yao and Tang (2001) and Lal (1983) who stated that erosion rate increases when there is an increase in slope which also result into a high runoff velocity on a steep slope but reduces the amount of infiltration. In contrast to this, Defersha *et al.* (2011) observed that erosion becomes greater with increasing slopes from 0 to 10 % and in many cases erosion rate decreases when the slope is greater than 10%.

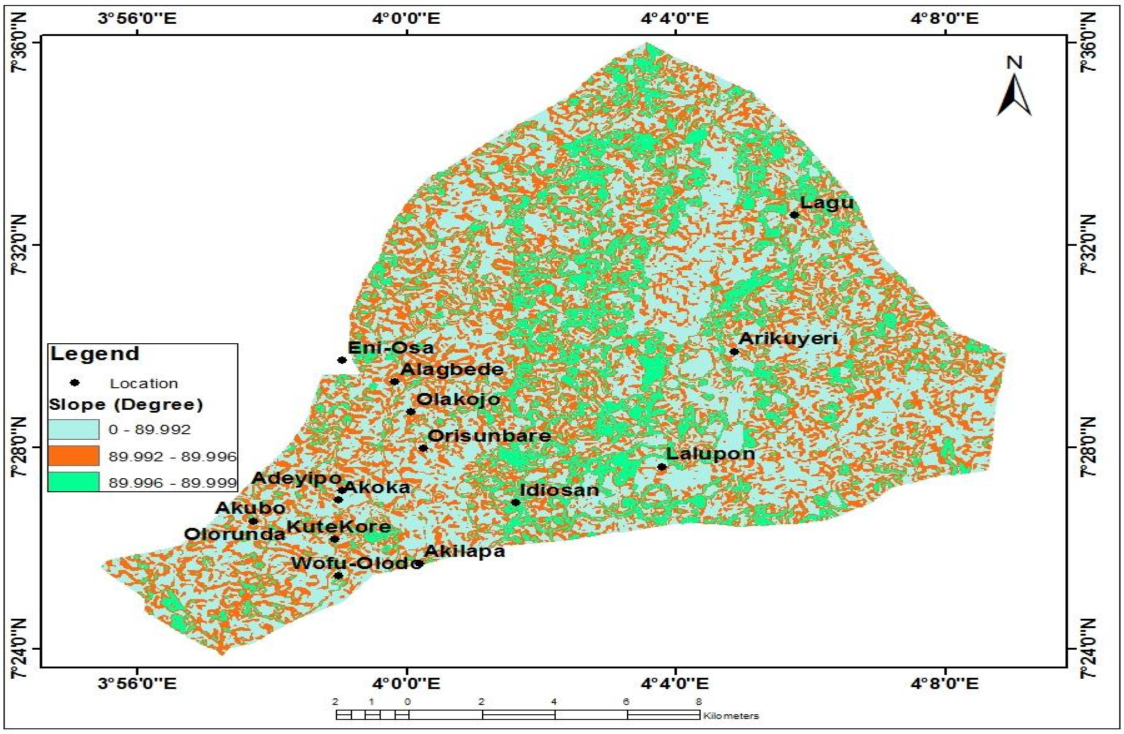

Figure 2: Slope

3.1.2 Land Use/Land Cover

Land use/ Land cover is an important factor impacting the earth system dynamics at global and local levels most especially its effect on erosion (Lepers *et al*., 2005). Although there are many factors influencing soil erosion, land cover and land use has been considered as the most important factor aiding the intensity of soil erosion (Leh *et al*., 2011).

Current Journal of Engineering and Science Research
Volume 3, Issue 8, pp 19-30, August 2026
ISSN (online): 3049-1738
DOI: https://doi.org/10.47001/CJESR/2026.308003
Available Online at https://www.cjesr.com

The land use and land cover (Figure 4) was classified into three such as, built-up, riparian forest and secondary forest. Secondary forest had the highest coverage with 49%, followed by built-up with 31%, while riparian forest had the lowest land coverage with 20% (Table 4.2).

However, each of the identified features has their role in either reducing or increasing the erosion rate. For instance, in the order of erosion risk arrangement, the built-up is greater followed by riparian forest, while the secondary forest had the least order of erosion risk. This has been affirmed by Alkharabsheh *et al*. (2013) showing the land use/land cover order of erosion risk arrangement such that most of the high-risk areas had significantly smaller land cover than the low-risk areas. Zhou *et al*. (2008) suggested that high erosion tends to occur when more than 30% of soil is exposed, while soil vegetation cover more than 78% can greatly reduce erosion by water.

Wijitkosum (2013) and Wei *et al.* (2007) explained reasons why vegetation cover affects the soil erosion. For instance, naturally plucked leaves from the trees directly protect the surface soil from splash erosion by weakens the kinetic energy of raindrops and slows runoff velocities. This can also conserve surface rainwater due to its strong moisture-holding capacity (Wei *et al.*, 2007).

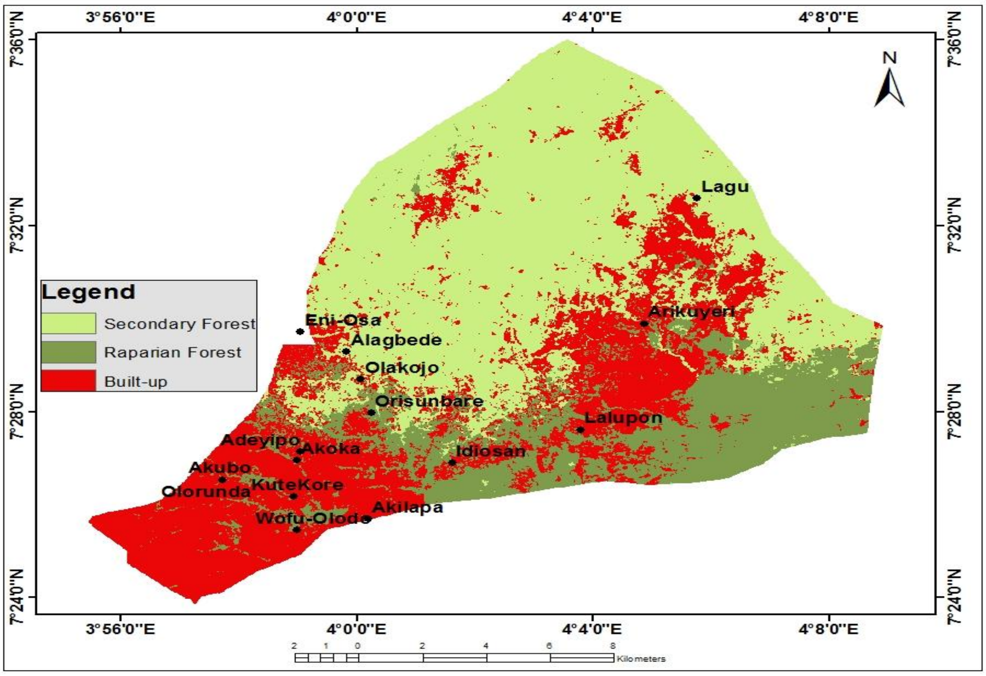

Figure 3: Land Use/Land Cover

3.1.3 Precipitation

Rainfall is one of the most significant factors causing erosion and this can be determined according to its duration, intensity and frequency of rainfall (Pathak et *al*. 2005; Romkens *et al*., 2002). Rainfall is the main source of energy for detachment and transport of soil particles from soil profile (Jain and Kothiyari, 2009; Desir and Marin, 2005).

The rainfall variability value ranges from 110.48 - 110.89 cm (Figure 5). This was classified into four classes such as 110.48 - 110.60cm, 110.60 - 110.69cm, 110.69 – 110.80cm and 110.80 – 110.89cm with the area coverage of 10%, 20%, 30% and 40% respectively. It was observed that the highest rainfall of 110.80 – 110.89cm was recorded at the southern part with major towns such as Akilapa, Wofu-Olodo, Kute-Kore, Akubo, Akoka, Adeyipo, Idiosan, Lalupon, Orisunbare, Olakojo, Alagbede, Eni-Osa and Arikuyeri, while Lagu was found in the lowest rainfall zone of 110.48 - 110.60 cm.

Current Journal of Engineering and Science Research
Volume 3, Issue 8, pp 19-30, August 2026
ISSN (online): 3049-1738
DOI: https://doi.org/10.47001/CJESR/2026.308003
Available Online at https://www.cjesr.com

However, the rate or the amount of rainfall is directly proportional to the intensity of erosion in a particular geographical area, which implies that the higher the rainfall, the higher the erosion risk. For instance, in order of erosion risk arrangement, erosion intensity found in area with rainfall value of 110.80 – 110.89cm is greater than 110.69 – 110.80cm, likewise the erosion intensity found in area with rainfall value of 110.60 - 110.69cm is also greater than 110.48 - 110.60cm. This was confirmed by Chimelu *et al*. (2013) who stated that the higher the amount of rainfall, the higher the quantity of soil particles that are dissolved, displaced and moved away which causes erosion and this was also corroborated by Rose (1993) who affirmed that the higher rainfall intensity results in higher rates of infiltration, excess runoff, and a much greater transport of suspended sediment load.

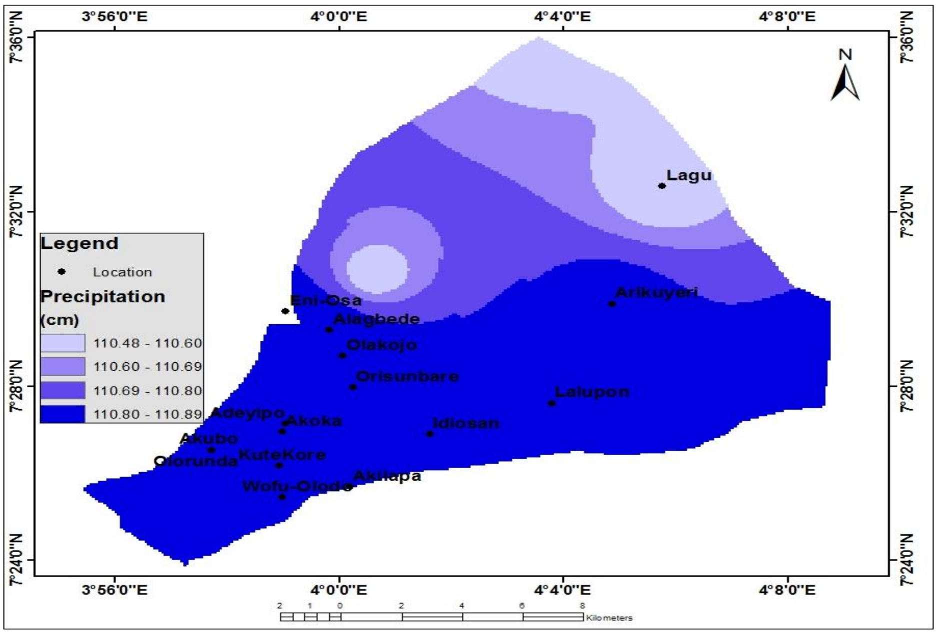

Figure 4: Precipitation map

3.1.4 Soil Texture and Organic Matter

Soil texture and organic matter parts of soil properties are inherent characteristics and qualities of soil (McCauley, 2005**).** Structure, texture, and porosity influence the movement and retention of water, solutes and air in the soil, which subsequently affect organism activities and plant growth (Pimentel, 2005**).**

The soil textures are shown in Figures 6, 7 and 8. The soil texture assessed includes sand, silt and clay. Silt variability ranges from 4.00 - 23.71% (Figure 6) and was classified into 4.00 -7.48%, 7.48 - 10.96%, 10.96 - 14.36% and 14.36 - 23.71% with the area coverage of 15.1%, 37.7%, 27.3% and 19.9% respectively. However, when relating the silt variability to erosion risk, it is inversely proportional which is confirmed according to Abdulkadir (2018) that the lower the silt the higher the erosion and vice-versa. For instance, the erosion risk area of silt class 4.00 -7.48% is greater than that of 7.48 - 10.96%, while the erosion risk of the area with the value of 10.96 - 14.36% is greater than 14.36 - 23.71 %. Areas that were found within the highest value of 14.36 - 23.71% silt that is the lowest erosion risk zone included Arikuyeri, Lalupon, Wofu-Olodo, Akoka, Adeyipo, Akubo and Olorunda, while areas that were found within the lowest value of 4.00 -7.48% of silt which is the highest erosion risk zone included Alagbede, Lagu, Olakojo, Orisunbare and Kute-Kore.

The sand distribution ranges from 68.08 – 91.99% (Figure 7) and was classified into 68.08 -76.24%, 76.24 - 81.31%, 81.31 - 86.56% and 86.56-91.99%, with area coverage of 15.7%, 31.8%, 36.0% and 16.5% respectively. When relating the sand variability to erosion risk, it is directly proportional which infer that the higher the sand, the higher the erosion risk in that geographical area and vice-versa (Abdulkadir, 2018). Areas found within the highest sand value of 86.56-91.99% which also connotes the highest erosion risk

Current Journal of Engineering and Science Research
Volume 3, Issue 8, pp 19-30, August 2026
ISSN (online): 3049-1738
DOI: https://doi.org/10.47001/CJESR/2026.308003
Available Online at https://www.cjesr.com

zone are Alagbede, Lagu, Olakojo, Orisunbare and Kute-Kore, while Areas found within the lowest sand value of 68.08 -76.24 % included Arikuyeri, Lalupon, Akoka, Adeyipo and Akubo.

Clay particles ranges from 68.08 – 91.99% (Figure 8). This was classified into 68.08 -76.24%, 76.24 - 81.31%, 81.31 - 86.56% and 86.56 - 91.99% with the area coverage of 15.7%, 31.8%, 36.0% and 16.5% respectively. When relating the clay variability to erosion risk, it is indirectly proportional to each other which indicates that the lower the clay, the higher the erosion risk in that geographical area and vice-versa (Abdulkadir, 2018).

The organic matter distribution in the study area ranges from 1.34 – 5.50% (Figure 9). This was classified into 1.34 – 2.24%, 2.24 – 2.91%, 2.91 – 3.93% and 3.93 – 5.50% with the area coverage of 32.1%, 31.7%, 29.5% and 6.7% respectively. According to Wei et al. (2007) organic matter accumulation could reduce the soil water loss, which infers that the higher the organic matter, the lower the risk of erosion. Areas found within the lowest value of organic matter of 1.34 – 2.24% included Alagbede, Lagu, Olakojo, Orisunbare and Kute-Kore, Akubo, Olorunda, Akilapa and Idiosan, while Arikuyeri was only found within the highest organic matter value of 3.93 – 5.50%.

Rosen (2009) argued that soils with high erosion risk could have been degraded which has resulted to reduction in infiltration and water-storage capacity, nutrient, organic matter content, porosity, productivity, vegetation growth and biodiversity.

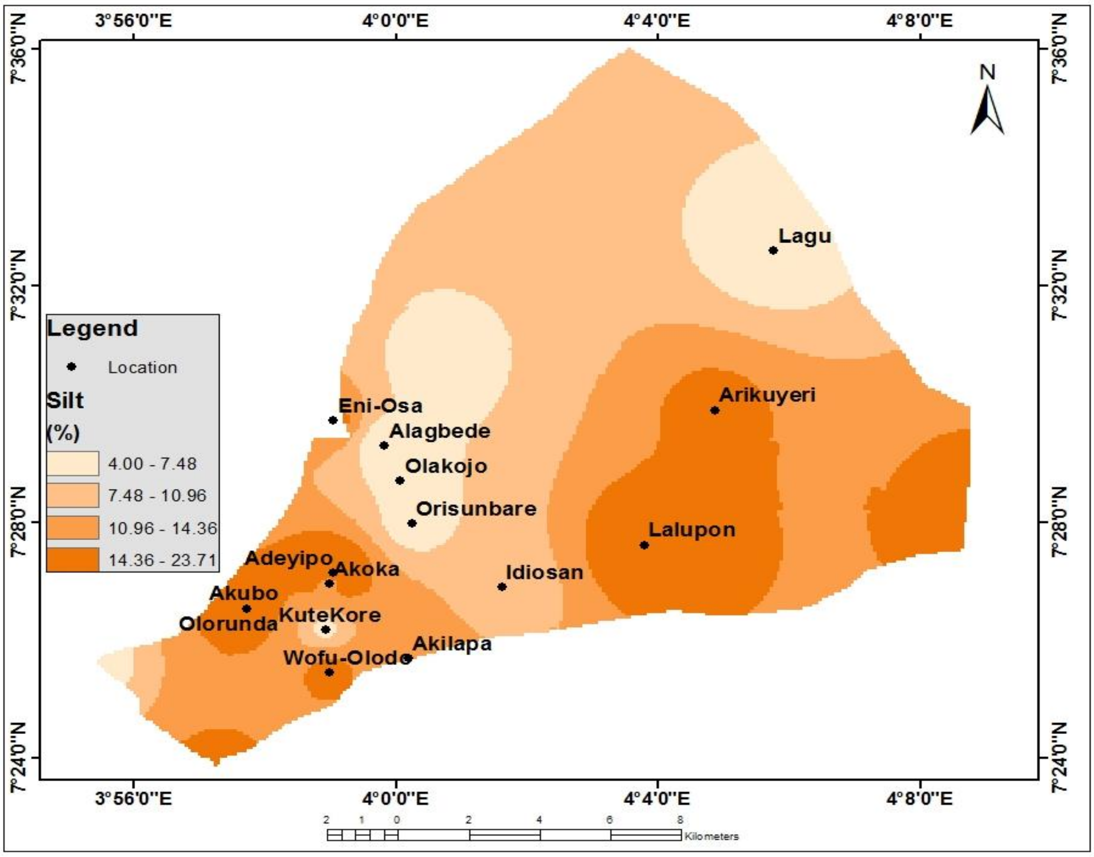

Figure 5: Silt Variability

Current Journal of Engineering and Science Research
Volume 3, Issue 8, pp 19-30, August 2026
ISSN (online): 3049-1738
DOI: https://doi.org/10.47001/CJESR/2026.308003
Available Online at https://www.cjesr.com

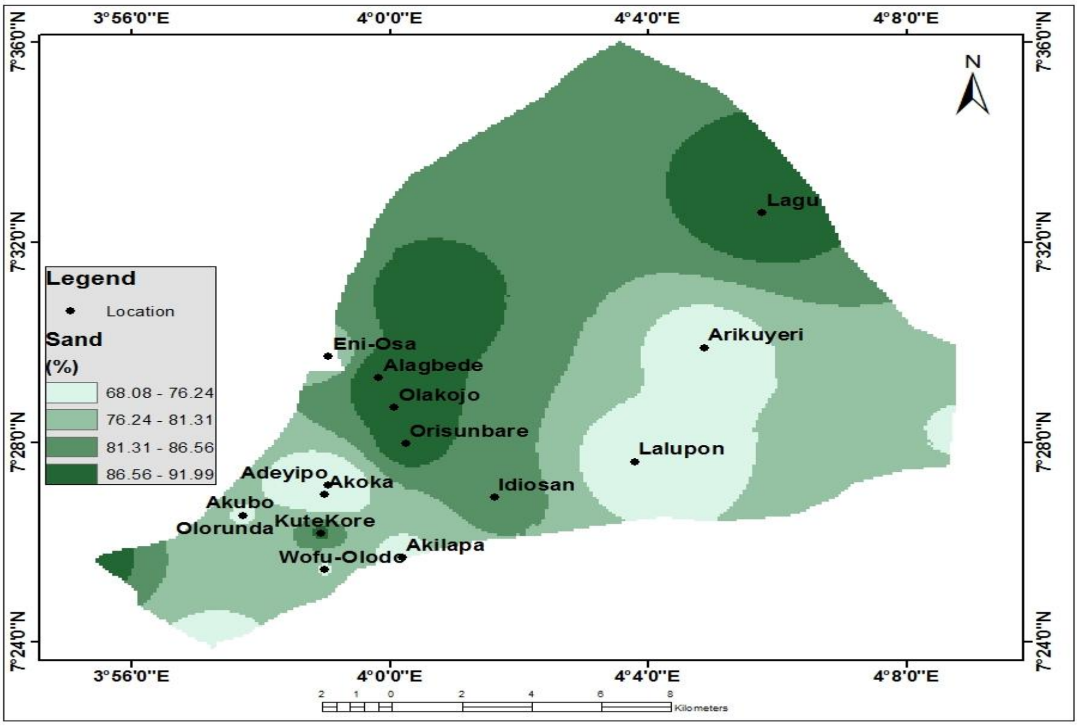

Figure 6: Sand variability

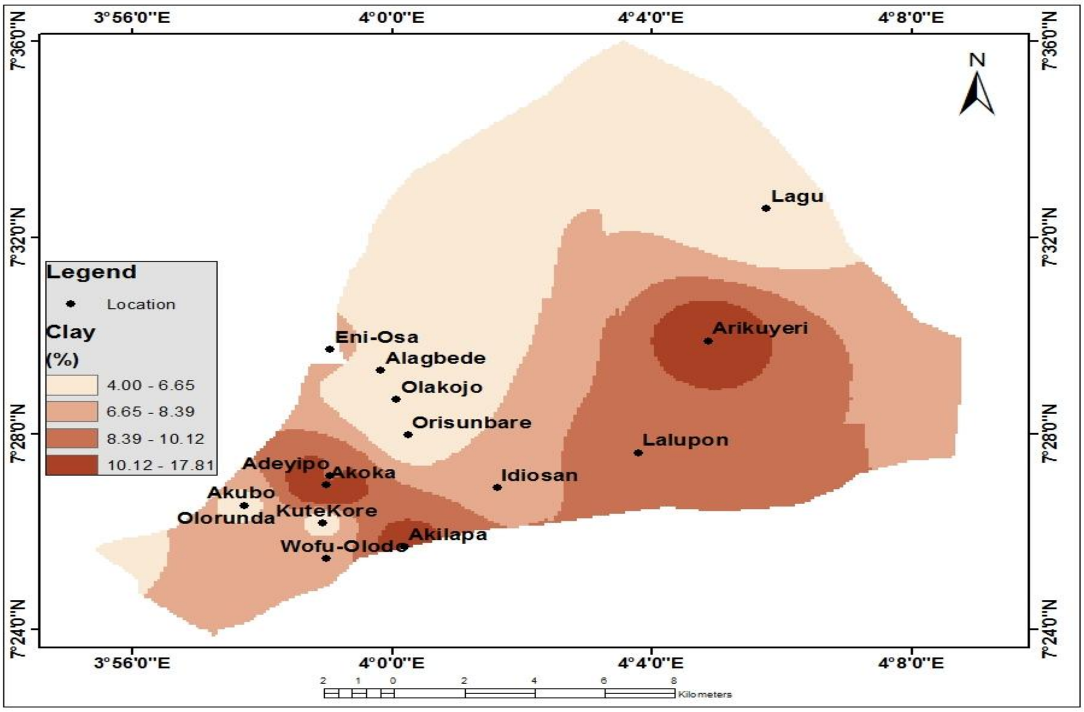

Figure 7: Clay Variability

Current Journal of Engineering and Science Research
Volume 3, Issue 8, pp 19-30, August 2026
ISSN (online): 3049-1738
DOI: https://doi.org/10.47001/CJESR/2026.308003
Available Online at https://www.cjesr.com

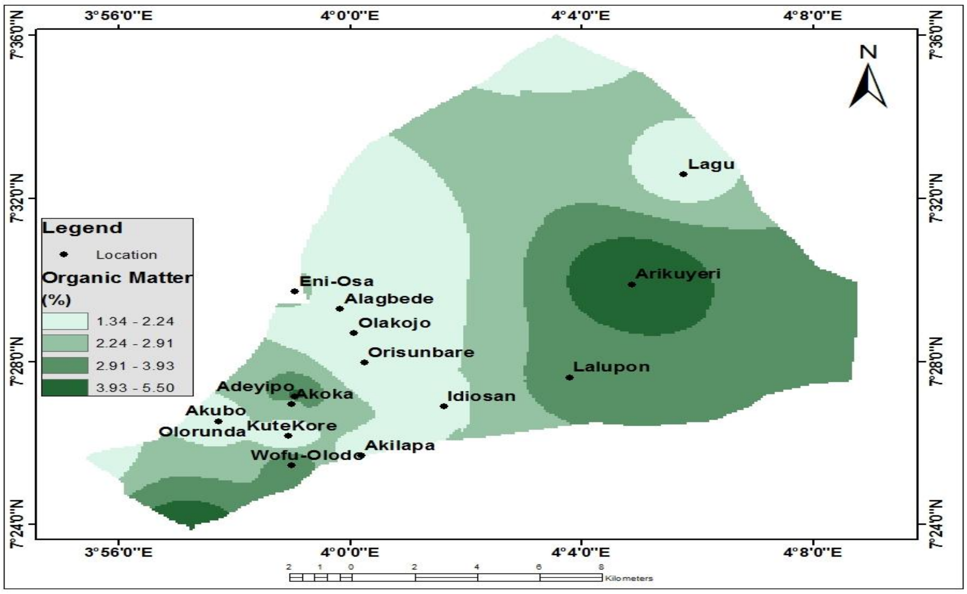

Figure 8: Organic Matter Variability

3.2 Erosion Potential Zone

The erosion Potential zone of the study area is shown in Figure 10. The erosion potential zone was classified into three categories: Low, moderate and high erosion potential areas (Figure 10 and Figure 11). The moderate erosion potential area had the highest area coverage with 20136.4 Ha (76%), followed by the low erosion potential zone with area coverage of 5034.1 Ha (19%), while the high erosion potential zone had the lowest area coverage with 1324.76 Ha (5%) (Table). Locations found in the high erosion potential zone included Idiosan, Kute-Kore, Orisunbare, Alagbede, Eni-Osa, and Wofu-Olodo while location found within the low erosion potential zone included Akilapa, Akoka, Adeyipo and Arikuyeri.

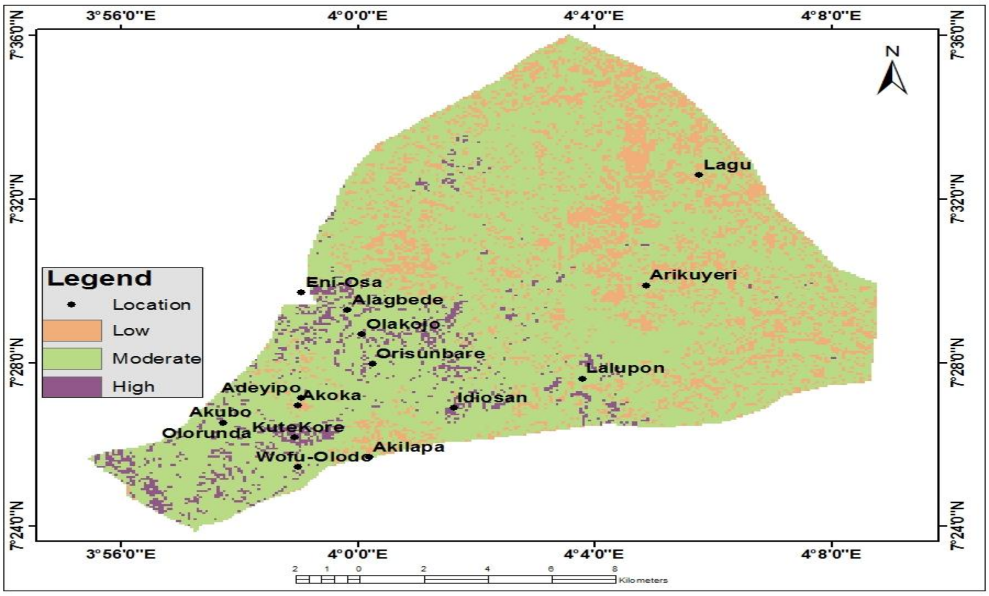

Figure 9: Erosion Potential map

Current Journal of Engineering and Science Research
Volume 3, Issue 8, pp 19-30, August 2026
ISSN (online): 3049-1738
DOI: https://doi.org/10.47001/CJESR/2026.308003
Available Online at https://www.cjesr.com

Table 1: Erosion Potential Zone

S/N	Parameter	Area Cover (Ha) & Percentage (%)
1	Low	5034.10 (19)
2	Moderate	20136.40 (76)
3	High	1324.76 (5)
	TOTAL	**26495.2 (100)**

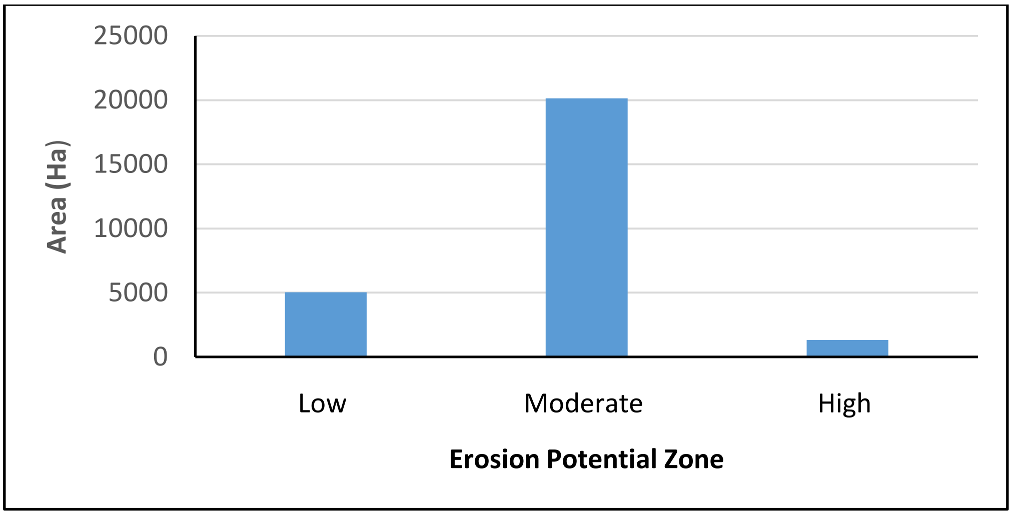

Figure 10: Erosion Potential Zone in Hectares

IV. CONCLUSION

This study assessed the soil erosion potential of Lagelu Local Government area using geospatial technique by combining topographic, climatic, soil-related and spatial factors responsible for erosion such as slope, land use/land cover, rainfall, soil texture and soil organic matter. These factors were generated, reclassified in the GIS environment, weight were assigned to them by AHP. These were inputted into weighted overlay tool in GIS environment where erosion potential/ hazard zone map was generated. The erosion hazard zone was classified into three categories which included low, moderate and high erosion potential areas with the area coverage of 5034.1 Ha (19%), 20136.4 Ha (76%), 1324.76 Ha (5%) respectively. A significant amount of the landscape is always at risk of degradation, as evidenced by the prevalence of moderate-risk zones (76%), with concentrated high-risk sections needing immediate attention.

The integration of geospatial technology in this study provides an affordable and scalable method for assessing erosion risk, especially in settings with little data. Considering all things, this study advances spatially integrated erosion modelling in tropical areas and offers a scientific foundation for well-informed decision-making targeted at improving food security, environmental preservation, and land sustainability. To further enhance model accuracy and facilitate long-term monitoring of erosion processes, future research should include temporal analysis and field validation.

REFERENCES

[1] Abdulkadir, A. (2018). Erosion Effect on Soil Physical Properties in Selected Farmlands in Gidan Kwano, Niger State. *Journal of Horticulture and Plant Research*, Vol. 2, pp 10-22.

[2] Adediji, A., Tukur, A. M., & Adepoju, K. A. (2013). Assessment of revised universal soil loss equation (RUSLE) in Katsina Area, Katsina State of Nigeria using remote sensing and GIS. *Iranian Journal of Energy & Environment*, 4(3), 255–264.

Current Journal of Engineering and Science Research
Volume 3, Issue 8, pp 19-30, August 2026
ISSN (online): 3049-1738
DOI: https://doi.org/10.47001/CJESR/2026.308003
Available Online at https://www.cjesr.com

[3] Adekoya, A.E., Meludu, N.T. & Adeniyi, T.K. (2000). Urban Crop Production: A Case Study of Ibadan North Local Government Area, Oyo State. *Journal of Agricultural extension* 4:15-21.

[4] Akinbile, C. O., & Yusoff, M. S. (2011). Environmental impact of leachate pollution on groundwater supplies in Akure, Nigeria. *International Journal of Environmental Science and Development*, 2(1), 81–86.

[5] Alkharabsheh, M.M., Alexandridis, T.K., Bilas, G., Misopolinos, N. and Silleos, N. (2013). Impact of land cover change on soil erosion hazard in northern Jordan using remote sensing and GI, *Procedia Environmental Sciences*, 19 912 – 921.

[6] Ananda, J. & Herath, G. (2003). Soil Erosion in Developing Countries; A socio Economic Appraisal' *Journal of Environmental Management*, 68(4):343-353.

[7] Andersson, L. (2010). Soil Loss Estimation Based on the USLE/GIS Approach through Small Catchments - A Minor Field Study in Tunisia. *PhD Dissertation, Division of Water Resources Engineering, Department of Building and Environmental Technology, Lund Uni-versity, Sweden*.

[8] Blaikie, P. (2016). The political economy of soil erosion in developing countries. *Routledge*.

[9] Borrelli, P., Lugato, E., Montanarella, L., Panagos, P., 2017a. A new assessment of soil loss due to wind erosion in European agricultural soils using a quantitative spatially distributed modelling approach. *L. Degrad. Dev.*, 28, 335–344.

[10] Borrelli, P., Robinson, D.A., Fleischer, L.R., Lugato, E., Ballabio, C., Alewell, C., Bagarello, V., 2017. An assessment of the global impact of 21st century land use change on soil erosion. *Nat. Commun.* 8 (1), 2013.

[11] Çelik, R. (2019). Evaluation of Groundwater Potential by GIS-Based Multicriteria Decision Making as a Spatial Prediction Tool: Case Study in the Tigris River Batman-Hasankeyf Sub-Basin, Turkey. *Water*, 11 (2630) 1-16.

[12] Chimelu, N., Okeke, F., Nwosu, K., Ibeh, C., Ndukwe, R., and Ugwuoti, A. (2013). The Role of Surveying and Mapping in Erosion Management and Control: Case Study of Omagba Erosion Site, Onitsha, Anambra State, Nigeria. *Journal of Environment and Earth Science*, 3(11):129-137.

[13] Defersha, M. B., Quraishi, S. and Melesse, A. (2011). The effect of slope steepness and antecedent moisture content on inter-rill erosion, runoff and sediment size distribution in the highlands of Ethiopia. *Hydrol. Earth Syst. Sci.*, 15, 2367–2375.

[14] Desir, G., and Marin, C. (2005). Factors Controlling the Erosion Rates in a Semi-arid Zone (Bardenas Realest NE Spain). *Catena*, 71:31-40.

[15] FAO., & ITPS. (2015). Status of the World's Soil Resources (SWSR)-Main Report, Food and Agriculture Organization of the United Nations and Intergovernmental Technical Panel on Soils, Rome, Italy.

[16] Federal Ministry of Environment. (2018). National policy on erosion and flood control. Abuja, Nigeria.

[17] Geng X, Zheng F, Liu L. 2010. Effect of rainfall intensity and slope gradient on soil erosion process on purple soil hill slopes. *Journal of Sediment Research*, (6): 48–53.

[18] Iliyasu, M. A., Buba, Y. A., Timnan, N., Sunny, E., Oyekeshi, N. (2019). Environmental Effects of Gully Erosion in Nigeria Case Study of Nanka Community, Orumba North, L.G.A of Anambra State. *Journal of Environment and Earth Science* 9(10) 68-82.

[19] Jain, S.K., and Kothyari, U.C. (2010). Estimation of Soil Erosion and Sediment Yield using Geographic Information System (GIS). *Hydrological Sciences Journal*, 45(5):771-786.

[20] Leh, M., Bajwa, S. and Chaubey, I. (2011). Impact of Land Use Change on Erosion Risk: An Integrated Remote Sensing, Geographic Information System and Modeling Methodology. *Land Degradation & Development. John Wiley & Sons, Ltd*.

[21] Lepers, E., Lambin, E. F., Anthony, C., Defries, J.R., Achard, F., Ramankutty, N. and Scholes, R.J. (2005). A synthesis of information on rapid land-cover change for the period 1981-2000. *Bio Science*, 55 (2):115-124.

[22] Liu, Z. and Jiang, Z. (1994). Study on the influence of rainfall factors and slope on sheet erosion. *Bulletin of Soil and Water Conservation*, (6): 19–22.

[23] McCauley, A., Clain, J., Jeff, J. (2005) Basic soil properties, *Development and Sustainability*. 9 114-123.

[24] Morgan, R.P.C. & Rickson, R.J. (2005). Slope Stabilization and Erosion Control: A Biogenering Approach. *Routledge (Taylor & Francis), London SE1 8HN. UK*.

[25] Nigerian Meteorological Agency. (2022). Annual climate review bulletin. *Abuja, Nigeria*.

[26] Oyebande, B.L. and Oguntoyinbo, J.S. (1970). Analysis of rainfall patterns in the South-Western States of Nigeria. *Nigeria Geogr. Journal*, 13, 141-162.

[27] Oyawoye, M.O. (1967). Petrology of a potassic syenite and its associated biotite, pyroxenite at Shaki, *Western*

CJESR JOURNAL

Current Journal of Engineering and Science Research
Volume 3, Issue 8, pp 19-30, August 2026
ISSN (online): 3049-1738
DOI: https://doi.org/10.47001/CJESR/2026.308003
Available Online at https://www.cjesr.com

Nigeria Contr. Min. Petrol, 16.115-138.
[28] Pathak, P., Wani, S.P., and Sudi, R. (2005) Gully Control in SAT Watersheds. Global Theme on Agro ecosystems. *International Crops Research Institute for the Semi-Arid Tropics*, p.28.
[29] Pimentel, D. (2005). Soil erosion: a food and environmental threat. Environment, *Development and Sustainability*. 8: 119–136.
[30] Rahaman, M.A.O. (1972). Geological map of /lero Area at 1:50,000 scale. Unpub!. *Report. Dept. of Geology, University of Ibadan*.
[31] Renard, K.G.; Foster, G.R.;Weesies, G.A.; McCool, D.K.; Yoder, D.C. (1997). Predicting soil erosion by water: A guide to conservation planning with the revised universal soil loss equation (RUSLE). *In USDA Agricultural Handbook; U.S. Department of Agriculture: Washington, DC, USA*, p. 703.
[32] Romkens, M.J., Helming, K., and Prasad, S.N. (2002). Soil Erosion under Different Rainfall Intensities, Surface Roughness and Soil Water regimes. *Catena*, 46(2-3):103-173.
[33] Rose, C. W. (1993). Erosion and sedimentation. In: Bonell, M. Hufschmidt, M. M. & J. S. Gladwell (Eds.), Hydrology and water management in the humid tropics. *Cambridge: Cambridge University Press*.
[34] Rosen, S. (2009) Soil physical properties and erosion risk at smallholder farms in Embu, Kenya, *Undergraduate Thesis*, pp. 4-7.
[35] Saaty, T.L. (2003) Decision-making with the AHP: Why is the principal eigenvector necessary, *Eur. J. Oper. Res.*, 145, 85–91.120.
[36] Sanchez, P.A. (2002). Soil fertility and hunger in Africa. *Science*, 295 (5562): 2019–2020.
[37] United Nations Environment Programme (UNEP). (2019). Global environment outlook – GEO-6: Healthy planet, *healthy people. Nairobi: UNEP.*
[38] United States Geological Survey (USGS). (2016). Landsat missions: Using remote sensing for land change analysis. *Reston, VA: USGS.*
[39] Wang, S., Sun, B., Li C., Li, Z., Ma, B. (2018). Runoff and Soil Erosion on Slope Cropland: A Review, *J. Resour. Ecol.* 9 (5) 461-470.
[40] Wei W., Chen L., Fu B., Huang Z., Wu D., Gui L. (2007): The effect of land uses and rainfall regimes on runoff and soil erosion in semi-arid loess hilly area, China. *Journal of Hydrology*, 335: 247–258.
[41] Wijitkosum, S. (2013). Impacts of Land Use Changes on Soil Erosion in Pa Deng Sub-district, Adjacent Area of Kaeng Krachan National Park, Thailand, *Soil & Water Resources*, 7(1): 10-17.
[42] Wischmeier WH and Smith DD (1978). Predicting Rainfall Erosion Losses: A Guide to Conservation Planning. *United States Department of Agriculture, Washington*, p. 58.
[43] World Bank. (2020). Nigeria erosion and watershed management project (NEWMAP) implementation report. *Washington, DC: World Bank.*
[44] Yao W, Tang L. 2001. The process of sediment and erosion of hydraulic simulation.
[45] Zhengzhou: The Yellow River Water Conservancy Press, 1–222.
[46] Z hou, P., Luukk anen, O., Tokol a, T., Nieminen, J. (2008): Effect of vegetation cover on soil erosion in a mountainous watershed. *Catena*, 75: 319–325.

Citation of this Article:

Adamu Ismaila, Adebayo Gbenga Ojo, Olaniran Emmanuel Aluka, Olakunle Rufus Oladosu, Seyi Festus Olatoyinbo, Abu Shuaibu, Isaac Utenwojo Ocholi, Oluwabunmi Fasote, Oyetoro Gbenga Gideon, & Maha Alih. (2026). Assessment of Soil Erosion Potential in Lagelu Local Government Area, Oyo State Nigeria. *Current Journal of Engineering and Science Research*. 3(8), 19-30. Article DOI: https://doi.org/10.47001/CJESR/2026.308003

***** End of the Article *****