THE REPORT ON GEOMOPHOLOGICAL PROCESSS IDENTIFICATION OF NASARAWA STATE NIGERIA

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Abstract: Remote sensing and GIS have become more essential for the study of geomorphology. Remote sensing plays a serious role in mapping, analyzing and interpretation of geomorphic structure, which provide a way to investigate the geomorphological characteristic of the location in earth surface without physical contact with the area of target.

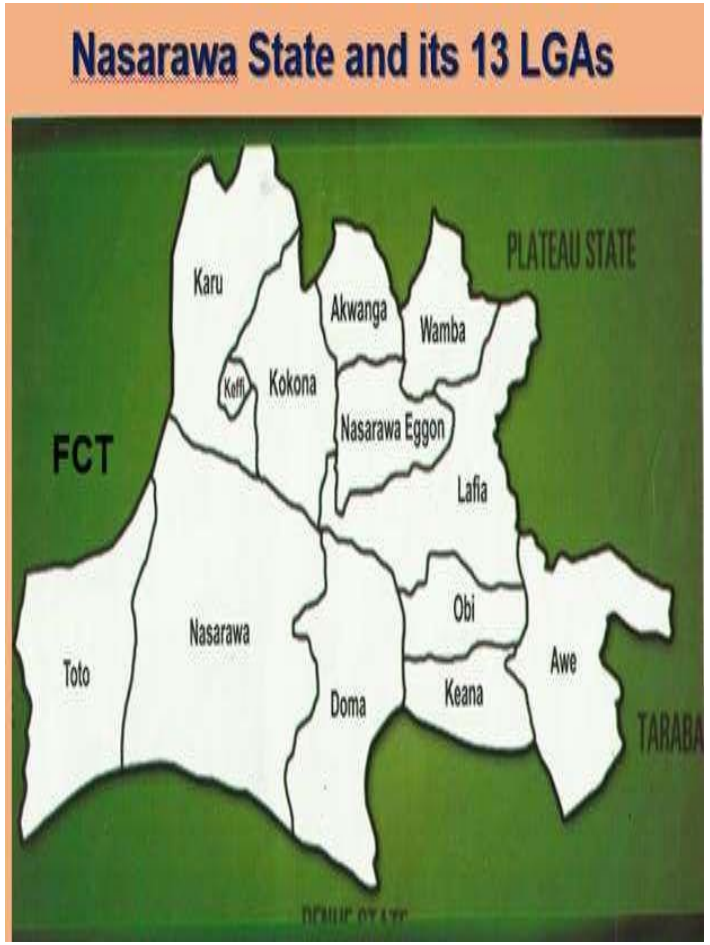
The shuttle Rader Topographic Mission (SRTM) data is an international research effort that obtain digital elevation models on a near-global scale, to generate complete high resolution digital topographic database of the earth. In this study, the main objective is to make use of remote sensing and GIS techniques in mapping out and analyzing hydrological and surface structural pattern of Nasarawa State.

INTRODUCTION

Application of Remote sensing and GIS have open a new ways of estimating different hydrological and surface structure of Nasarawa, examples are the flow direction, flow accumulation, basin, stream order Hill shade, contour and slope direction of the area of target. With the use of Remote sensing software known as Arc Map.

STUDY AREA

Nasarawa state with the north central region of Nigeria, bordered to the east by the state of Taraba, And Plateau, to the north by Kaduna State, to the south by the state of Kogi And Benue, and to the west by the Federal Capital Territory, the state has 13 local government areas and capital Lafia, Area of 27, 117kmsquare (10, 470sq mi), population of about 1,869,377 at 2006 population census. The state lies between latitude 70451 and 90371 of the Equator and between longitude 70 and 9037 of the Greenwich meridian.


Nasarawa State and its 13 LGAs
PLATEAU STATE
Karu
Akwanga
Wamba
Kokona
Keffi
Nasarawa Eggon
FCT
Lafia
Obi
Nasarawa
Toto
Awe
Doma
Keana
TARABA

MATERIAL AND METHOD:

In the study an srtm(shurtle radar topography mission) data was downloaded from USGS earth explorer, then imported

into arc map for manipulations, the study area was also inserted and clip together by using clipping tools at Arc Toolbox after the target area and srtm data was clip together the fill was estimate, follow by the flow direction, then flow accumulation was measured, then the basin was gotten to know all the catchment area in nasarawa state.

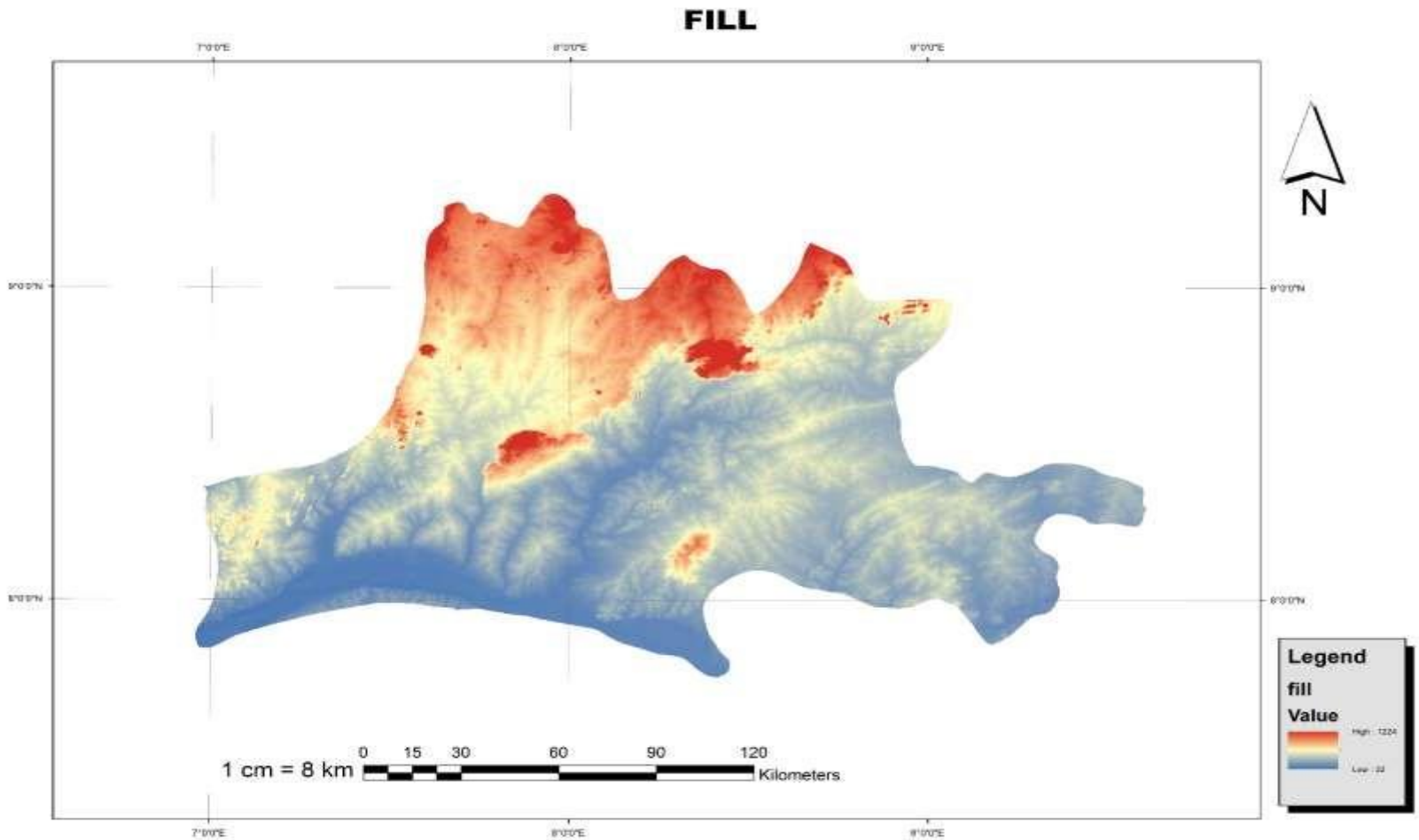
SOFTWARE: ArcMap is the only software used in this analysis. It was used for the enhancement and processing of the analysis on the study area.

AIM AND OBJECTIVE: To reduce loss of life and property produce by natural hazard in Nazarawa state. Examples of natural hazards are erosion, wind action can be control by cultivating proper agricultural practice that fit particular area. To know a particular characteristic peculiar to certain land in order to make the suitable or best use of that land.
To understand how the change in climatic and weather condition have influence changes in Land structure in the past which will help in estimating what could occur in future and avoid any artificial hazard like flooding course by deforestation and how drainage channel can done in the state.
To understand the best location for agriculture, like cultivating where irrigation can easily achieve during dry season for plant use and how dam can be constructed for irrigation purpose.

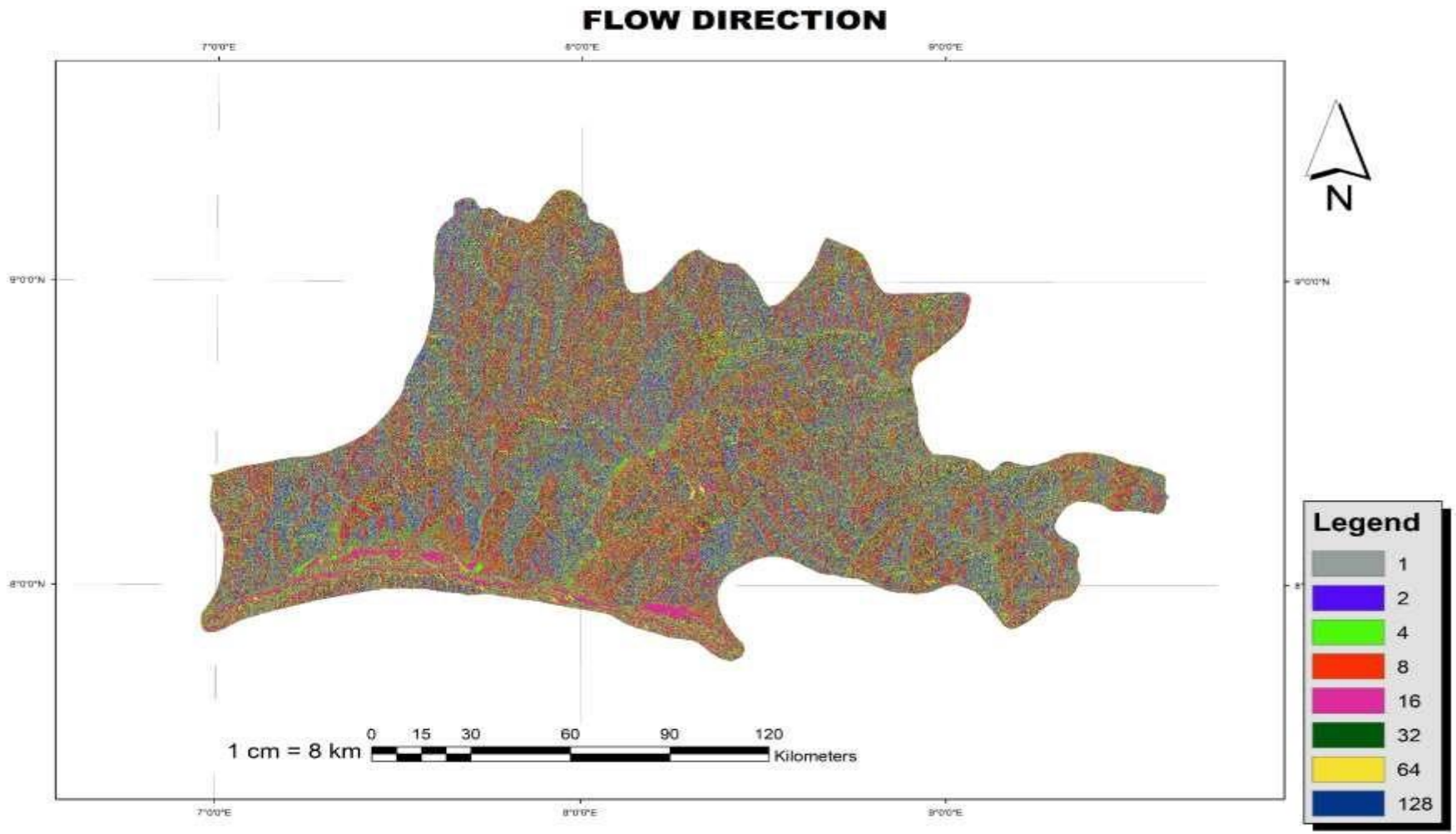
To also understand the main area that is suitable for the dam construction through making use of water flow accumulation, flow direction, basin and slope.

HYDRO-GEOMOPHOLOGY: Been defined as an interdisciplinary science that focuses on the interaction and linkage of hydrologic processes with landforms or earth materials and the interaction of geomorphic processes with surface and subsurface water in temporal and spatial dimensions. The term 'hydro-geomorphology' designates the study of landforms caused by the action of water, Hydro geomorphology describes and evaluates the environment, in which water circulates, thus providing the information to understand the situation and to make the proper decisions. Quantitative study of drainage basin provides the theoretical base for the hydro geomorphic approach, suggesting that certain unvarying drainage basin characters can be correlated to the hydrologic response of a basin.

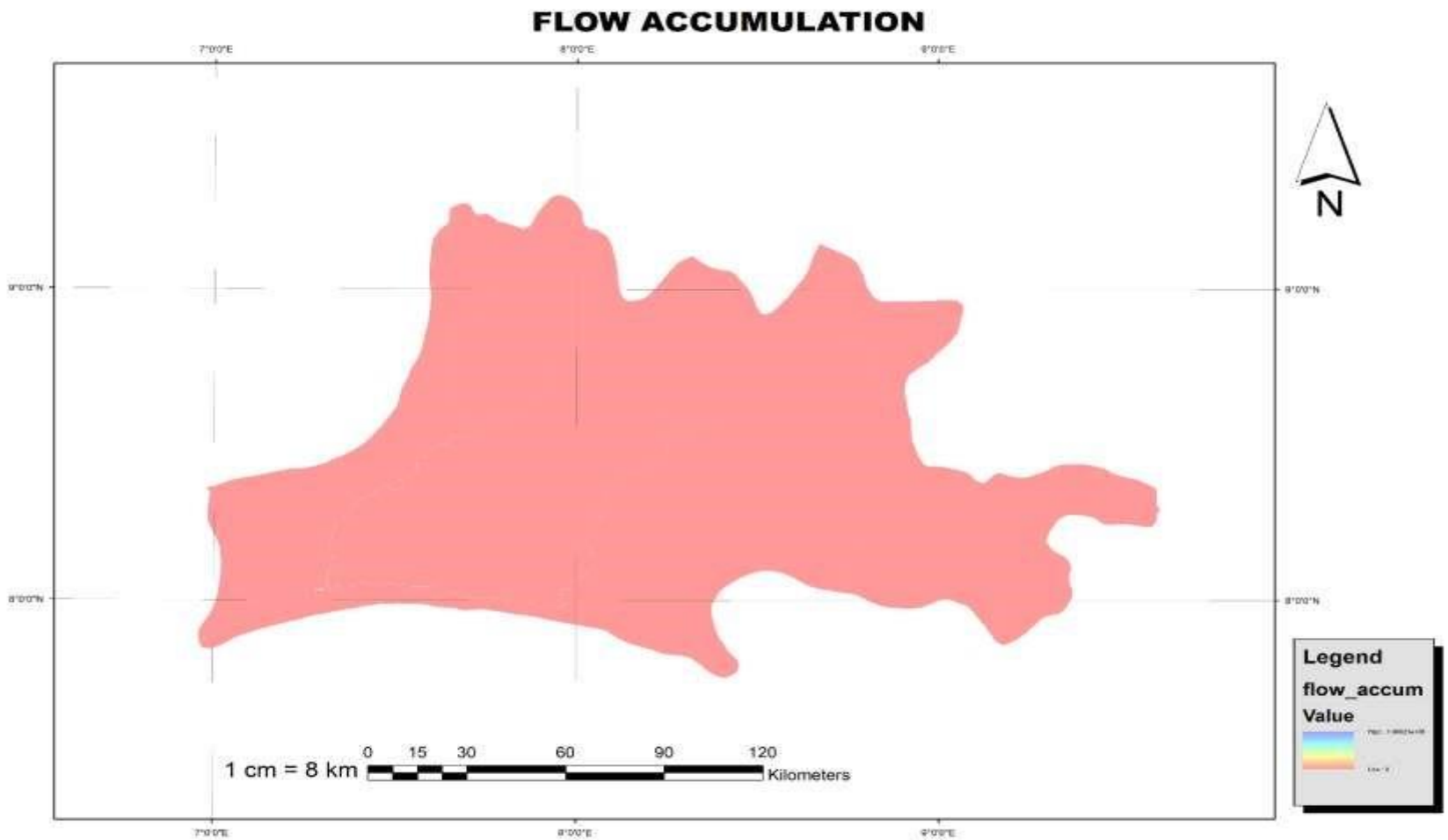
FILL: The Fill tool uses the equivalents of several tools, such as Focal Flow, Flow Direction, Sink, Watershed, and Zonal Fill, to locate and fill sinks. The tool iterates until all sinks within the specified z limit are filled. As sinks are filled, others can be created at the boundaries of the filled areas, which are removed in the next iteration.



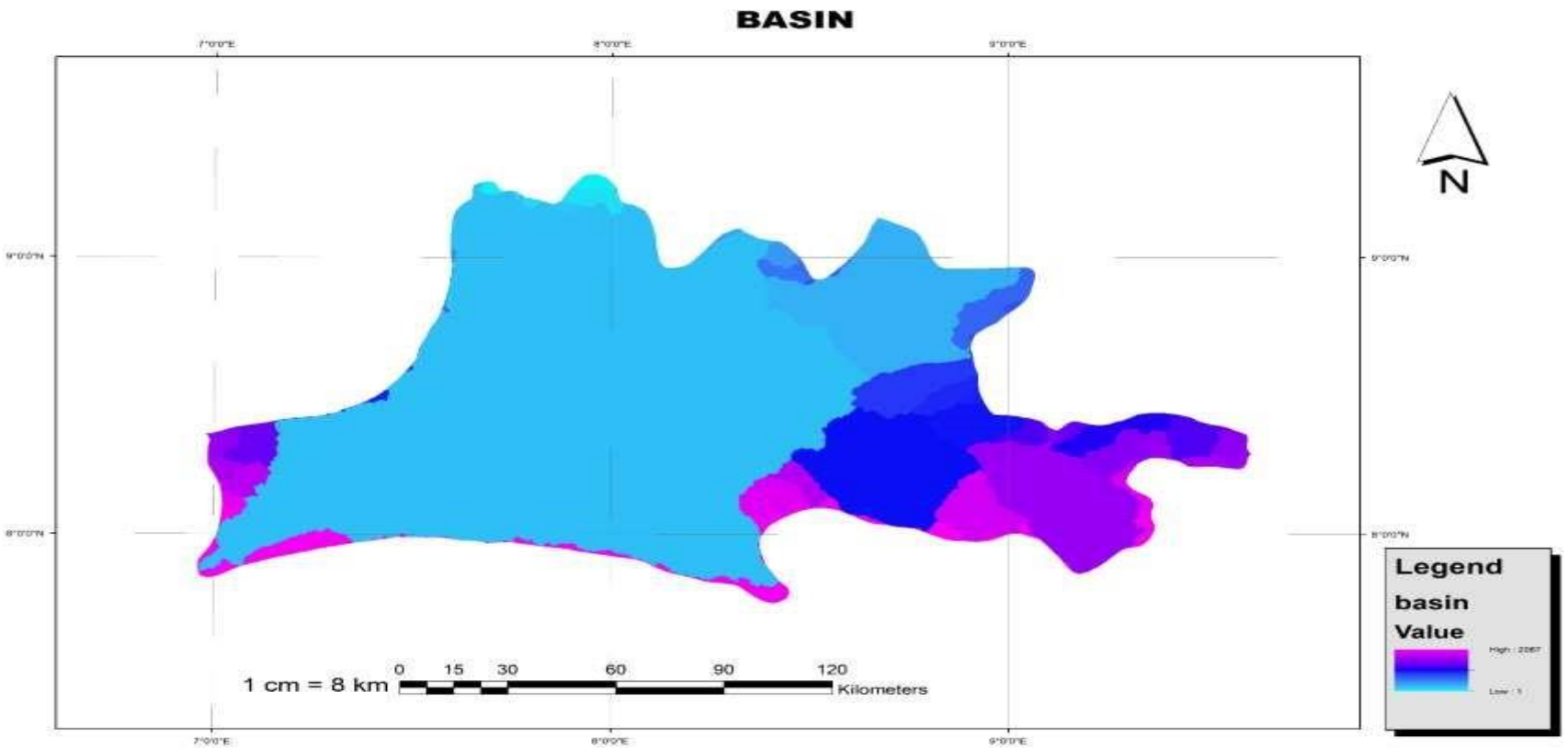
FLOW DIRECTION: Flow direction means the direction the stream flows in each cell, Flow direction calculates the direction water will flow using the slope from neighboring cells. Based on the direction of the steepest descent in each cell, we measure flow direction.



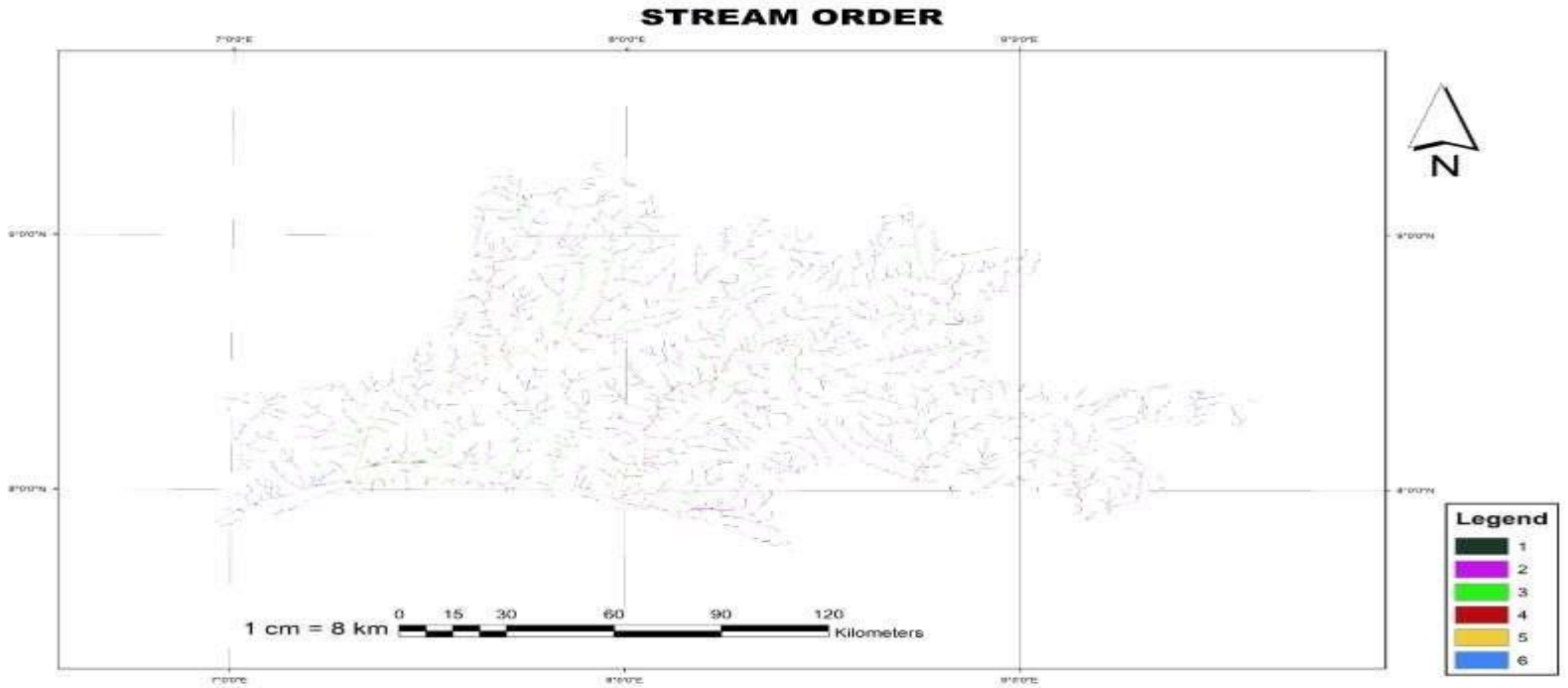
FLOW ACCUMULATION: Flow Accumulation. In the process of simulating runoffs, the flow accumulation is created by calculating the flow direction. To each cell, the flow accumulation is determined by how many cells that flows through that cell; if the flow accumulation value is greater, the area will be easier to form a runoff.



BASIN: A drainage basin is an area of land where all flowing surface water converges to a single point, such as a river mouth, or flows into another body of water, such as a lake or ocean. A basin is separated from adjacent basins by a perimeter, the drainage divide, made up of a succession of elevated features, such as ridges and hills. A basin may consist of smaller basins that merge at river. Other terms for a drainage basin are catchment area, catchment basin, drainage area, river basin, water basin, and impluvium.



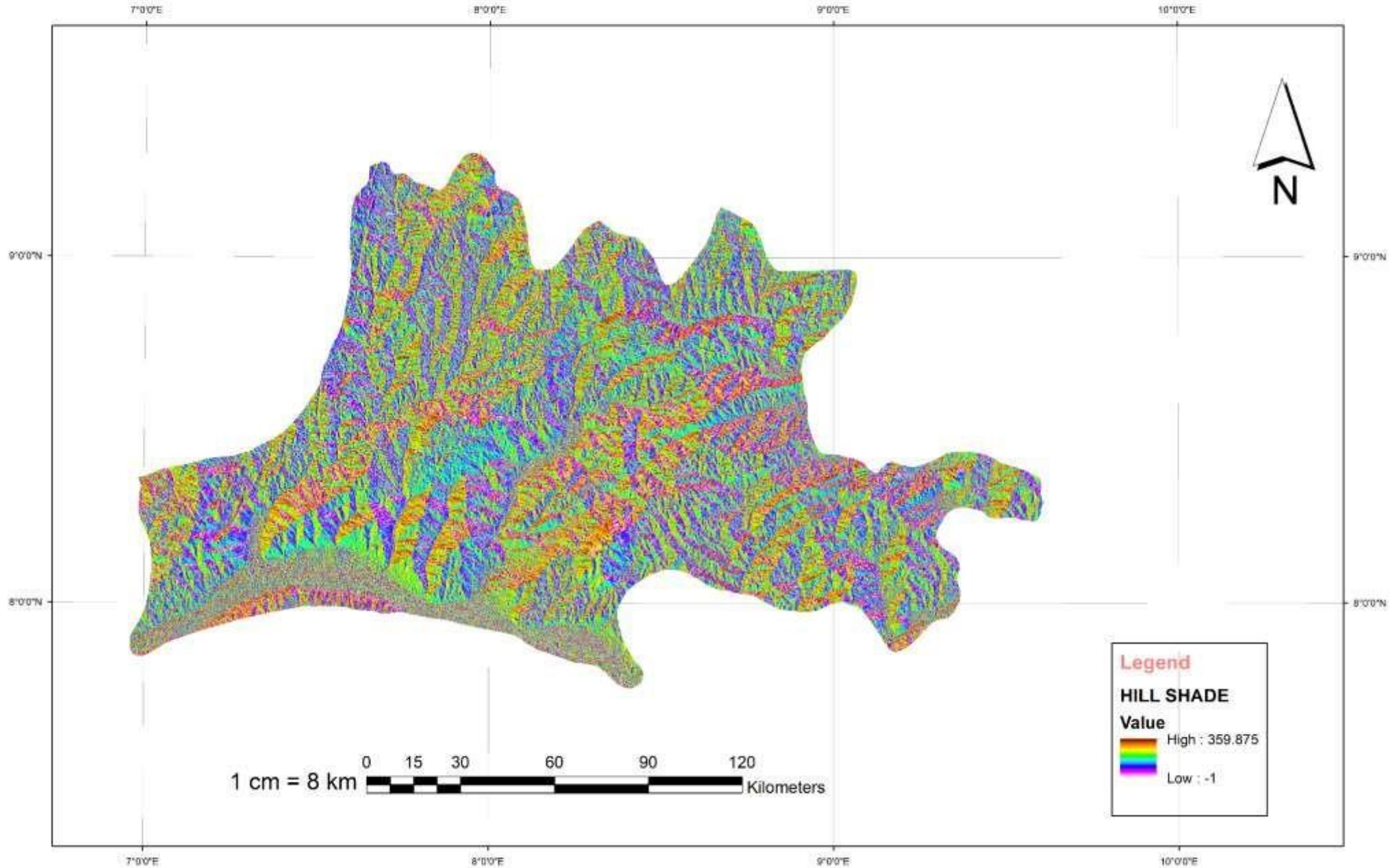
STREAM ORDER: A stream is classified as a body of water that flows across the Earth's surface via a current and is contained within a narrow channel and banks. The stream order or water body order is a positive whole number used in geomorphology and hydrology to indicate the level of branching in a river system. A first-order stream is the smallest of the world's streams and consists of small tributaries. These are the streams that flow into and "feed" larger streams but do not normally have any water flowing into them. Also, first- and second-order streams generally form on steep slopes and flow quickly until they slow down and meet the next order waterway. There are six order of stream in nasawara state whereby the black indicate the first order and last is the sixth order that indicate blue color.



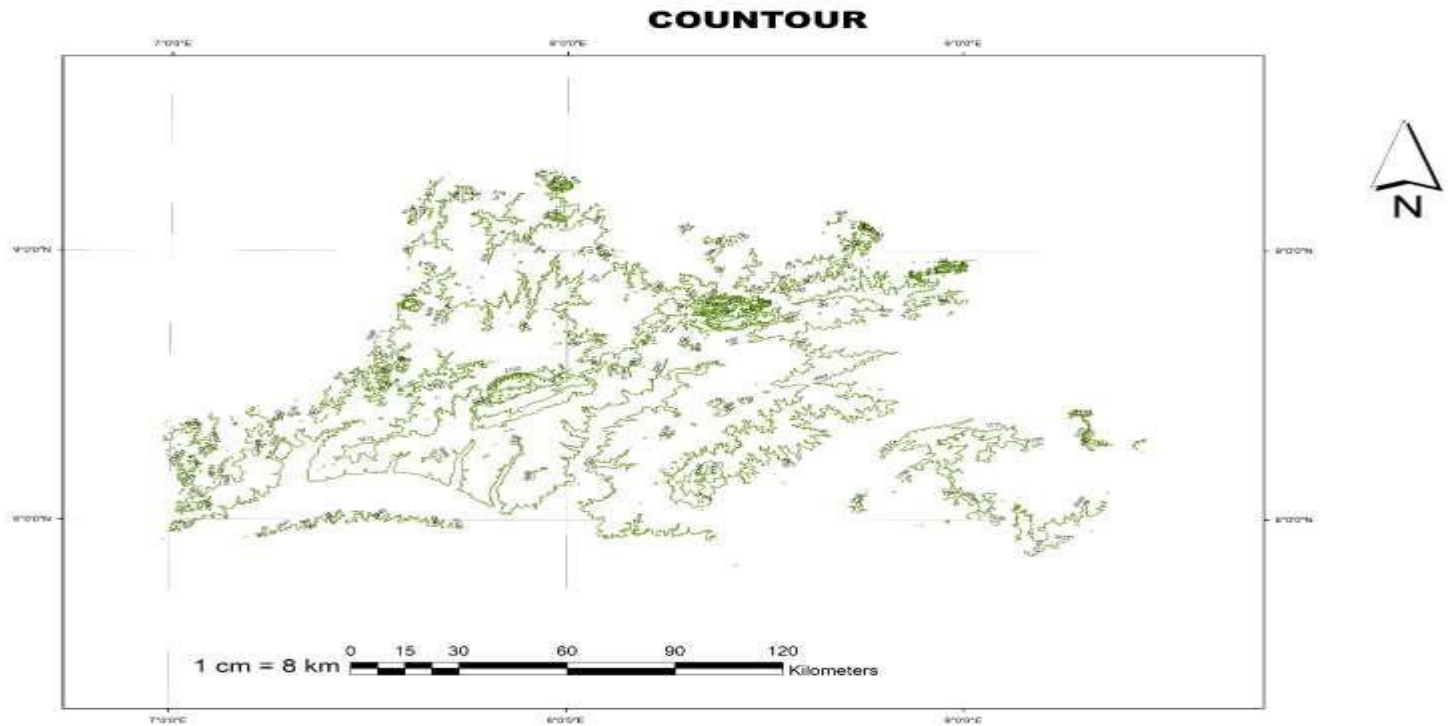
SURFACE GEOMOPHOLOGY: is literally the study of the form or shape of the Earth, but it deals principally with the topographical features of the Earth's surface. It is concerned with the classification, description, and origin of landforms. The configuration of the Earth's surface reflects to some degree virtually all of the processes that take place at or close to the surface as well as those that occur deep in the crust.

HILL SHADE: Hill shading is a technique used to create a realistic view of terrain by creating a three-dimensional surface from a two-dimensional display of it. Hill shading creates a hypothetical illumination of a surface by setting a position for a light source and calculating an illumination value for each cell based on the cell's relative orientation to the light, or based on the slope and aspect of the cell. A hill is a piece of land that rises higher than everything surrounding it. It looks like a little bump in the Earth. Since they are higher than everything around them. a technique where a lighting effect is added to a map based on elevation variations within the landscape. It provides a clearer picture of the topography by mimicing the sun's effects (illumination, shading and shadows) on hills and canyons.

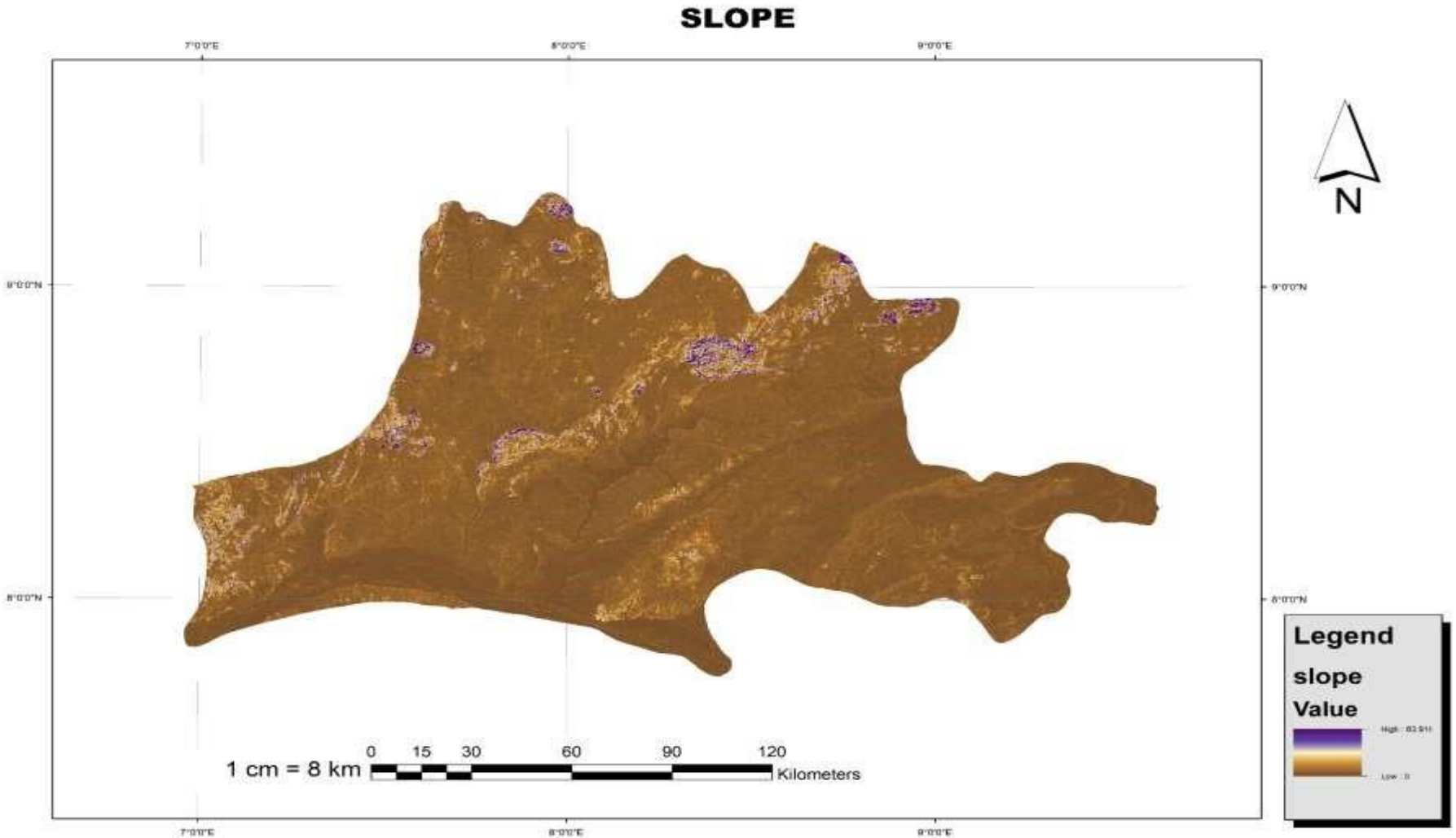
HILL SHADE


7°0'0"E
8°0'0"E
9°0'0"E
10°0'0"E
9°0'0"N
8°0'0"N
N
Legend
HILL SHADE
Value
High : 359.875
Low : -1
1 cm = 8 km
0 15 30 60 90 120
Kilometers

CONTOUR LINE: contour line (often just called a "contour") joins points of equal elevation (height) above a given level, such as mean sea level. A contour map is a map illustrated with contour lines, for example a topographic map, which thus shows valleys and hills, and the steepness or gentleness of slopes. The contour interval of a contour map is the difference in elevation between successive contour lines. Contour lines are curved, straight or a mixture of both lines on a map describing the intersection of a real or hypothetical surface with one or more horizontal planes. The configuration of these contours allows map readers to infer the relative gradient of a parameter and estimate that parameter at specific places.



SLOPE: slope refers to the angle of the surface of the Earth compared to an imaginary, level line. Slopes are measured in grades, which corresponds to the change in elevation over a set distance. The greater the change in elevation in that distance, the greater the slope.



CONCLUSION: The study of geomorphological structure of nasarawa have help in identify how to make the most suitable uses of the area of land by proper investigation done with the GIS application, have brought us full information on how the area could be developed in term of constructions road, dam, drainage and built-up, also agriculture in terms of different kind of plant that is easy to be cultivated in the area of land under favorable weather condition, it as well make it easy to point out some solutions to any environmental hazard that may occur due erosion in the slope area, by proper drainage system and afforestation.

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Geological Society of America.

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