

**GEOMORPHOLOGY AND AGRICULTURAL
DEVELOPMENT IN LUNGLEI DISTRICT
MIZORAM**

ABSTRACT

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ABSTRACT

In the present study, an attempt has been made to find out the links and the influences of the regional geomorphological factors, viz., Relief, slope, drainage etc. on agricultural development of Lunglei district, Union territory of Mizoram. As Lunglei district is full of rugged hilly topography, its lithological and structural characteristics of rocks, it has ample scope for the investigation of geomorphological processes and its agricultural development. It is quite sure that the agricultural practices of the area *has* emerged under the influences of the regional processes of landforms and their characteristics manifestations. The present study is a humble attempt in the same direction.

The study area lies between longitude $92^{\circ}35'E$ to $93^{\circ}55'E$ and latitude $22^{\circ}35'N$ to $23^{\circ}35'N$. The region is demarcated by Bangladesh in the west, Aizawl district in the north, Burma in the east and Chhimituipui district in the south. The total area of the district covers about 4538 sq. kilometres.

METHODS OF STUDY

To study the essential elements of terrain of Lunglei district it has been undertaken measurement and analysis of surface morphological features by employing standard geomorphic techniques. For example, the morphometric techniques which have been used in the present study include the characteristics and nature of average slope, drainage density, stream frequency, superimposed profiles etc. It also includes mathematical calculations to obtain various data from the drainage basins. In this connection the following techniques have been used: stream ordering, law of stream numbers, law of mean stream length, stream frequency, drainage density, sinuosity indices and bifurcation ratio. The above methods have been used to compare the results and for further generalization and correction of accuracy, extensive field studies have been undertaken.

In Chapter I of the study the general introduction and a brief survey on available literature have been attempted. Various studies on regional geomorphology in different part of the world as well as in the Indian context have been done. A general introduction about

the study area, its location, salient features, sources of materials, methods of study and a brief working plan of the study have been done.

In Chapter II, the genral account of geology, geological history, structural characteristics of rocks and tectonic history of the region have been discussed. The structural characteristics of rock formations of Lunglei district reveal that the area falls within the part of Tripura-Mizoram mio-geosynclinal basin which evolved after the regional upliftment of Barail group of sediments and thus was related with the plate behaviour in the subduction zone of west Arakan-Yama, after the spreading of Indian Ocean. The rocks of this region are similar with that of Himalayan ranges of other north eastern part of India. This region, in course of Himalayan upliftment has been uplifted to its present height and the geomorphic processes are still in its initial stages.

In Chapter III, evolution of landform, geomorphic processes like different types of weathering and fluvial geomorphic cycle have been discussed. The study of evolution of landform and geomorphic characteristics of Lunglei

district reveal that the area is predominates by hilly dissected and immature landform. The study of geomorphic processes reveal that the mechanical weathering predominates mainly in the steep and gentle slopes where Jhum cultivation is practised. The repeated process of heating and cooling of sandstones and shales which are poor conductor of heat give rise to stress and strain in the upper layers of rocks mass in the temperature thus disintegrate the rock surface due to excessive burning for the Jhum land. Chemical weathering predominates, mainly in the steep slope in the form of hydration and solution upon the softer rocks. Rockfalls and landslide is a common feature throughout the region especially along the major road cutting and steep hill slopes. The cycle of erosion is still in its youthful stage.

In Chapter IV of this study, various hill slope elements, analysis of average slope, stream frequency, drainage pattern and identification of erosion surfaces has been discussed. In the study of various hill slope elements, it is interesting to note that the pediment is missing and the debris slope is more prominent. The hillslope elements of Lunglei district indicates the

immature topography. Being a young topography of the region the slopes are still developing stage. The average slope of Lunglei district varies between 2 to 45 degrees and above. The variation in slopes are directly influenced by the topography, Lithological and structural characteristics of the underlying rocks. It is clear that in the initial stage there was a tremendous faulting and folding took place in the area. Gradually due to some agents of erosion the landscape changes gradually to its present forms. The major areas of Lunglei district is covered by 3-6 stream per sq. mile. North western part show higher stream frequency of 6-7 stream per sq. mile. Relief, climate, vegetation are the physical factors which are responsible for the drainage density but the most important being lithology and structural characteristics of rocks. Two main drainage pattern has been identified such as parallel and sub-parallel and rectangular pattern. The drainage pattern of the district reflects the influence of initial slopes, inequalities in the rock hardness, structural controls, folded topography, infiltration capacity and the geomorphic history. Due to presence of break in gradient in the longitudinal profiles of the river suggest the rejuvenation of the old erosion

surface. Numerous waterfalls of the region indicates the rejuvenation of the area in recent past. The researcher has identified two erosion surfaces with the help of superimposed profiles, longitudinal profiles, and generalized contours and with the help of field evidences.

In Chapter V, the quantitative analysis of ten sample drainage basins of the region have been discussed. In this chapter the researcher has discussed the morphometric techniques in two separate aspects, viz., the linear and the areal aspects. In the linear aspects stream ordering, law of stream numbers, law of stream lengths, sinuosity indices, and in the areal aspects, drainage density, constant of channel maintenance, stream frequency have been correlated and discussed.

The quantitative analysis of ten selected small basins reveals that there is no direct relationship between area and number of stream segments, while the area is directly correlated with the length of the streams. The hypothesis, that bifurcation ratios within a basin decreases with the increasing order has been confirmed. Empirical data from ten selected basins of the district allows

evaluation of relief and the laws of stream number and laws of mean stream lengths on a senile erosion surface. Due to dissected topography and lack of well-developed relief, the valley network is not complete. The standard sinuosity indices indicates that only Saitumlui and Darkhua-nglui flow in a straight course, while the rest eight streams flow in a sinuas course. All the basins with a high topographic sinuosity and high hydrolic sinuosity index indicates that these basins are still in their early stages of development. The study of drainage density brings out an interesting relationship with the relief. It has been found that a rise in drainage density occurs with increasing relief in all the ten small drainage basins.

In the Chapter VI attempt has been made to regionalise the area into micro-geomorphic region. On the basis of superimposition of morphometric maps viz. streams frequency, relevant profile, dissection pattern, geological map, relief, slope, drainage system nature of erosion and structural characteristics of rocks Lunglei district is delineated into three micro-geomorphic regions such as:

- i) Moderately dissected undulating hill region of the west.
- ii) Highly dissected, denudated and sharp crested region and
- iii) Central and Eastern Escarpments.

In the Chapter VII of the study the agricultural framework, the factors which control the agriculture, general landuse, cropping pattern, agricultural methods and techniques and shifting cultivation has been discussed. The study of agricultural framework reveal that Lunglei district is agriculturally backward while about 90 per cent of the total workers are directly or indirectly engaged in agriculture as cultivators and agriculture labourers. The district produces only 30 per cent of the total rice requirement of the district. The growth and development of agriculture was not encouraging during the past decades due to several factors such as:

- 1) Geomorphic characteristics like (a) Nature of Terrain (b) Problem of Irrigation (c) Uncertainty of rainfall (d) Uneven distribution of rainfall (e) Frequency of cyclones (f) soil erosion.
- 2) Pattern of human behaviour.
- 3) Location in reference to market.

The regional study of land use in Lunglei district reveals that planned use of land resources has not yet started and the agriculture methods techniques and implements in the district are very backward due to several physico-economic factors. Due to inhospitable nature, environment and difficult terrain about 90 per cent of the total farmers practice Jhum cultivation.

Chapter VIII deals with the study of the impact of morphometric attributes on agriculture landuse from the five selected villages of Lunglei district. The study throws the light that the agricultural landuse pattern in the district indeed is the result of the interaction of the physical and the historico-socio-economic factors. The prominent governing factors of agriculture in the region are various morphometric attribute like rugged and dissected relief, steep gradient of slope, inadequate water supply to irrigate the field and to some extent nature and amount of rainfall.

Chapter IX deals with the influence of landforms on location and distribution of rural settlement and transport and communication. In this chapter effort has been made to explain the relationship between landform characteristics viz., relief, average slope, drainage and climatic condition with location and distribution of rural settlements. The study confirms that the density of population decreases from east to west. The most important factor is a east-west increase of humidity and temperature which results into a general unsuitability of the climate for human habitation. The study also reveals

that due to rugged topography and dissected terrain with numerous narrow deep valleys and escarpments the development of roads and communication lines is very difficult.

Having studied the different aspects of the physical background and the pattern and problems of land use in Lunglei district it related to the factors of physical geomorphological and to some extent the socio-cultural factors of the area. The geomorphic aspects dominates the pattern of land use in the entire area. Rugged topography and great differences in elevation and relief brings about contrasts in climate, surface drainage and underground water-supply. These factors influences the pattern and development of agriculture in this region.

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