

SHILLONG AND ITS ENVIRONS A STUDY IN URBAN GEOMORPHOLOGY

ABSTRACT



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Introduction to the Study Area and Statement of the Problem

During the past three decades, Meghalaya has experienced an increasing trend towards urbanisation that has been at the same time both rapid and uneven. This growth pattern is consequent to the movement of people and jobs to the urban areas. The result has been the evolution of urban communities from villages into towns or urban region as in the case of Shillong. This growth has brought forth a vast array of goods and services, an ever expanding spatial distribution of people, as well as a host of urban problems.

The inexorable trend toward very large, extremely complex and urban places is a result of forces whose origin lie in the political, economic and social systems of our society. Of particular significance that promote or sustain growth, two forces emerge. These are (a) population growth (b) the expansion of public investment. The linkages between the two are demand and development.¹

The resulting effects of these two factors are demand for and pressure on land. Impacts on land result also from changing use of land as it is converted from natural areas to agriculture, and, or suburban, commercial and industrial uses. These can be termed as direct impact. Indirect impacts result from the promotion of growth, development and urbanisation.²

With mounting concern over the impacts on natural environment, particularly from urbanisation, it has become apparent that an objective, analytical strategy is necessary to assess the subtle but far reaching impacts of geomorphological forms and processes, because such a strategy could profit from interdisciplinary modelling experiences and findings. It is in the light of this context that the city of Shillong has been selected as an area for study.

History on the Evolution of Shillong

The evolution of Shillong from small and scattered hamlets into a big city of today started in 1863 when the British acquired lands on lease for the purpose of creating a civil station and sanatorium.³ In 1874 it was made the capital of Assam with some interruptions till 1973. And from 1970 till today it has become the capital of Meghalaya. Through the formative years Shillong steadily grew and expanded in size. Its present geographical area is approximately 120 square kilometres. Its population in 1881 was a mere 3,737 and today over a hundred years later its population soared to above over a half million (2001 Census).⁴

As it grows it is also beset with problems of space resulting in the mushrooming growth of unplanned settlements plus a host of other problems like sanitation, water supply, narrow roads, traffic jams, etc. This unprecedented growth of population with limited urban facilities and amenities has led to a tremendous pressure on land. As such this is another

point which needs attention for remedial measures in proper planning and management of the land with due emphasis on geomorphic characteristics.

Because of the complexity and urgency of urban problems, an urban geomorphological approach can be adopted to provide a comprehensive and interdisciplinary approach model to aid in studying the complicated nature of our cities.⁵ An urban geomorphological approach can be adopted as geomorphology being the science of landforms, falls within the broad framework of geography, which is concerned with the interaction between man and environment.

Review of Literature

Many articles and books have been written on the evolution, history and scenic beauty of Shillong but no relevant literature existed or been written on urban geomorphology of Shillong though scanty literatures on geology, climate, vegetation and its people are available.

However, some geomorphic studies of Meghalaya existed and have been undertaken by workers such as R.K. Rai (1985),⁶ P.C. Panda (1985),⁷ G.C. Panda (1987),⁸ M. Agarwal (1993),⁹ H.J. Syiemlich (1997)¹⁰ and L. Cajée (2002).¹¹

Elsewhere, in other parts of the world, studies in urban geomorphology have gained ground. Notable studies on this line worth mentioning are “Geomorphology and Urban Development in the Manchester Area” by Ian

Douglas.¹² This work underlined the impact of geomorphology on river dynamics, urban growth, glacial deposits, subsidence, sewer collapse and ground conditions. Then another notable work “Aspects of Urban Geomorphology – Ground Movements in parts of Salford and Bury” by C. Harrison and J.R. Petch,¹³ traced and explained the history of ground movements and landslips. It was a pioneering work in so far as ground movements affect urban growth and development. There are also other works such as *Urban Geomorphology in Dry Lands* by R.G. Cooke *et al.*¹⁴ This study was undertaken as a consequent of serious soil erosion, landslides and widespread flooding where hundreds of people were killed and thousand of homes ruined. The dominant environment processes responsible for this crisis are geomorphological problems, problems relating to the nature of land surface and the forces that act upon it.

In India the study of urban geomorphology, first appeared in 1988. This study was *Mussoorie and Its Environs* by H. Prasad.¹⁵ This study underlined the impact of geomorphology in identifying areas for establishment of new settlements.

As stated earlier, Shillong covering an area of over 120 square kilometres has elevations ranging from 1000 metres to above 1900 metres above mean sea level. So with a height difference of 900 metres the city thus has diverse topographical features consisting of undulating topography,

moderate to steep slopes, cliffs and a fair amount of isolated flat lands. In such a topographical set up, settlement patterns have been greatly controlled by geomorphic forms. This, therefore, calls for a need to understand the geomorphological forms and processes so that planning and proper management and decision-making policy in urban development can be undertaken and executed.

Objectives of the Study

The main objectives of the study are:

- (i) Analysis of geomorphic characteristics.
- (ii) Identification and delineation of geomorphic provinces and their distribution.
- (iii) Identification of morphometric parameters related to the study such as slopes, relief, drainage, etc.
- (iv) Delineation of high, medium and low-density settlements and their patterns.
- (v) Identification of roads and water supply their impact on landuse and problems.
- (vi) Identification of sewage disposal problems and their impact on the environment.

Data

The data for this study has been generated primarily by extensive fieldwork and secondary sources where toposheets are used extensively.

Methodology

The methodology adopted were as follows:

(i) Pre field work; (ii) Field work; (iii) Post field work.

Chapter-II deals with six different physical aspects of the study area and is arranged as follows:

(i) Geology; (ii) Climate; (iii) Topography; (iv) Drainage; (v) Vegetation; (vi) Soils.

In order to highlight the geology of the area, a general description of the state is first given and is based on published data of the Geological Survey of India.¹⁶

Regarding the geology of the study area, the geological formation and tectonics have been inferred basically on the collection of fossils and identification of exposed rocks in the field. Tectonic activity has been inferred from the exposed topographical features like escarpments of the Dymmiew area and the structural adaptation of streams to lithology. Examples of such streams are Umkhrah, Umshyrpi, Wah Tamdong, Umshing and Wah Shala.

Climate of the study area has been assigned as sub-tropical monsoon climate and also referred as humid mesothermal climate¹⁷ in empirical classification. The factors influencing the climate of Shillong are (i) existence of protected forests in the northern face of Shillong Peak-Kynton Sngi range; (ii) the Barapani reservoir; (iii) increasing built up area.

Shillong, though small in area, it has a range of differences regarding precipitation and temperature. These differences occur within short distance and at varying elevations. These differences has been ascertained from the weather column of *Shillong Times*.¹⁸

Topographically Shillong is comprised largely of escarpments, denuded hills, undulating topography, steep slopes and isolated flatlands.¹⁹ In terms of area, the undulating topography covers 124 sq kms and occupies the central part of the study area. Escarpments are seen in the *Dymmiew*²⁰ and Wah Tamdong, precipice on the western edge of Shillong and Umkhen valley.

The drainage systems in the study area is comprised of twelve streams with proper names and terminologies these are Umjapung, Umshing, Umladew, Wah Tamdong, Wah Shala, Wah Umbah, Wah Mawlynrei, Umkhrah, Umshyrpi, Umdiengpun, Wah Umiam and Umkhen.

Chapter III has been divided into two parts – (i) Physical Environment and (ii) Social Environment.

Under Physical Environment a geomorphometric analysis of rock groups, slopes, drainage systems, relief and geomorphic provinces have been dealt with in detail by using standard techniques adopted by geomorphologists.

In the Social Environment demographic characteristics, analysis of socio-cultural and economic factors and their impact on urban growth, infrastructural network analysis and settlement characteristics have been highlighted.

The Geo-environmental problems of the study area relating to deforestation, water resources, topographical constraints, urbanisation and environmental degradation have been dealt with in Chapter IV.

A thorough analysis on the population growth and urbanisation of the study area with special emphasis on its decadal and rate of urbanisation and development have been carried out in Chapter V.

Finally, in Chapter VI the emergent of geo-environmental issues have been brought out and some remedial measures have been suggested.

Findings and Conclusion

The topography such as steep slopes and escarpments deter the expansion of urbanisation. However, the most suitable areas for urban development as derived from the various geomorphometric analyses is apparent at elevations between 1400 to 1600 metres.

The trend of population growth upto 2001 shows an increase in population resulting in demand and pressure on land. This is amply demonstrated by the inclusion of another village, Nongmensong, to form the Shillong Urban Agglomeration.

With the rapid growth of population and urbanisation leading to an increase in various man-made activities, large quantities of pollutants and wastes are being continuously released into the city environment. Thus in the race for progress and development, the people of Shillong might lose the race for healthy survival, if answers are not found to the twin spectres of over population and environmental degradation.

Random expansion without taking geomorphic studies into consideration leads to infrastructural and environmental problems. As a practice in geomorphological studies, delineation of geomorphic provinces for any type of landuse is indispensable.

On the basis of these and other findings, it may be derived that similar conditions may prevail in other hill stations of the country as well

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