CHAPTER - I
1.1 INTRODUCTION:

Geomorphology, the study of landform, has emerged as a significant branch of applied science since geomorphological landscape is a platform where cultural drama is played by man during his adjustment with nature. It is in this context that settlement which is being reflected in human occupancy and is also the outcome of interacting forces, have assumed new significance in geographical studies. The geomorphological analysis, both qualitative and quantitative of any area, exposes the various environmental attributes where human adjustment with the former has resulted into the development of the ultimate cultural landscape. Hence, all the concrete expressions of humanised landscape including human habitation are, thus correlated with the landform (morphometric attributes of landform).

Despite the enormous growth of settlements in different parts of the world during this century, research methods for the analysis of such settlements have developed in a rather haphazard way. On the whole, investigators have created methods appropriate to each particular situation, drawing on their own ingenuity, practical experience, and the techniques of other disciplines (demography, ecology, biology, sociology and statistics to mention a few). This was necessary in the early stages of settlement research. The need is not so much for an increase in the volume of research
but rather for investigations to move from a narrow provincialism to international and cross-cultural comparisons, for it is only in a comparative context of such scope that our knowledge and explanations of settlement phenomena may be judged adequate and valid.

The settlement i.e., the place of habitation is one of the important aspects of study from the standpoint of planning and development of a region. The human landscape is dependent on physical landscape. These two have a close relation. The latter provides the space where the former is to be settled. In some areas the natural phenomena (physical landscape) restrain habitation and compel man to seek other favourable physical landscape. Thus for selecting a place of habitation man has to depend on physical landscape. Agriculture which is dependent on landform and other aspects of landscape ecology directly, helps man initially to reside in a place, evidence of which is traced back to the Indus, Sumerian and Egyptian civilizations – the supreme human achievements of the 4th millennium B.C. Even today it is equally true in an agricultural country such as, India and other developing countries of the world. Agriculture is one of the main links between a human group and the landscape in which it lives and which it exploits. Through agriculture every environment (physical, cultural and so on) has taught its inhabitants a certain way of life. ‘The teacher of a culture is its environment, and agriculture its class-room’.

Therefore, a thorough and careful study of landform relating to the settlement is essential, particularly, in an agrobased econo-
my. The present work relates to an identified backward area - District of Bankura, West Bengal (India) - characterized with predominance (more than 92%) of rural population (rural settlement) and agricultural activities. Because of the diversified terrain ranging from hills, rolling undulations to plains and monotonously flat plain, settlement in the district is unevenly distributed. Accordingly, the density of settlement, spacing of settlement, dispersion of settlement and so on are not uniform in character throughout the district. Therefore, a causative relationship may be revealed between the landform and settlement in the district which will ultimately be helpful for future planning and development. The aim of the present endeavour is to fill a gap in the current array of settlement study by dealing purely with methods and techniques of scientific work in this field and ultimately to establish a relationship between landform and settlement in the area under consideration.

1.2 AIMS AND OBJECTIVES:

The aim of the present thesis is to study the relationship between landform and settlement in Bankura District, West Bengal.

To achieve this objective the following aspects of study are taken into consideration,

(a) the study of landform attributes - absolute relief, relative relief, ruggedness index, dissection index, slope, drainage density etc;
(b) the study of settlement attributes - density of settlement, density of residential houses, dispersion of settlement, spacing of settlement etc;

(c) the qualitative study of relationship between landform attributes and settlement attributes both individually as well as collectively and finally

(d) the study of quantitative relationship between landform attributes and settlement attributes of the district under consideration (both macro and micro-level studies).

1.3 A SURVEY OF PAST WORK:

Settlements which are a concrete expression of human occupancy of the earth’s surface have always attracted the attention of geographers. Though the history of human settlement started with the history of human civilisation, early references, along with the features of physical landscape are scattered here and there only in ancient books on religion and philosophy and in the accounts of early explorers and travellers. Even these references are not found in a systematic way or in chronological order. Therefore, it is not an easy task to make a global survey and arrange them chronologically.

Though it was Carl Ritter who paved the way for settlement studies in the early 19th Century and was the pioneer, the contributions of A. Keitzen (1895), A. Lemangeon (1925), H.W. Ahlmann
could not, however, be ignored. The other early workers whose names are alluded in different books on settlement studies include Kohl, Hiththofen, Ratzel, Martiny, Nitz, Brunhes, Blanchard, Lefevre, Aurousseau, Houston, Chisholm, Bowman, Kohn, Jordon, Hudson, Bunge, Loxiadius and so on. However, the real credit of developing this branch of study into an independent discipline goes to A. Weitsen (1895) of Germany.

The studies on landform and settlement have been made by different scholars separately at different times and in different countries including India. In India and in other developing countries where agriculture plays a vital role, settlement is to be studied in relation to landform (as mentioned earlier) but very few works are made till date on this line.

In India settlement geography itself as a field of study has taken a late start. The publication of Prof. R.L. Singh's paper on the "Meaning, Objectives and Scope of Settlement Geography" (1961) actually accelerated the real development of settlement geographical studies in India. Since then and upto the last decade most of the studies are repetitive in nature. In many cases, theories and models of Western authors have been blindly adopted. Till the last decade only 41.8% of the total geographical works done by Indian universities is on Human Geography of which only 9.6% is on settlement geo-

Landform studies achieved considerable progress during the last four decades especially after the Second World War. After World War I, most of the geomorphological investigations took a new turn and landform studies were stressed, mainly by the American geomorphologists (Kellong). The American scientists were of the opinion that the physical factors - soil and landform attributes especially slope and surface configuration etc. because of their relative permanence in nature are the fundamental considerations for landform studies. In addition to this American approach, there were various approaches of landform studies by Storie (1933), Stamp (1936), Jacks (1946) and Albeiter (1940). During the later part of the inter War period and shortly after World War II, it was found that the American approach had a great impact on landform studies.
ships (Milne) ultimately resulted in Linton's (1951) scheme for the delimitation of the morphological units. However, Linton's approach was probably the first approach of scientific study at all levels of details in explaining a regional pattern of the landscape which were not done before by his predecessors. Thus Linton furnished a theoretical basis for modern landform studies including their applications in applied studies. The modern geomorphology which is rather an applied science occupies a very unique and distinctive position in the landform and other allied studies.


In this connection it may however be mentioned that there
are only a few research works made on the lines of the present treatise i.e., on the relationship between landform and settlement and related topics have so far seen the light of the day not only at the global and national levels but also at the regional and local levels.

1.4 LIMITATION OF THE WORK:

The district of Bankura is mainly a rural one (92.37% rural population, 1961) with only five urban agglomerations and is covered by twentyone (21) Survey of India topographical sheets (1:50,000) In studying the details of the morphometric attributes of landform as well as settlement characteristics some limitations are considered here. Not all the limitations in the present work stem from its restricted purpose. A truly comprehensive treatment of the relationship between landform and settlement in the district would embrace such diverse topics as the organisation of field studies, the use of standard statistical techniques and the preparation of research reports. It would also extend to methods for the analysis of a wide variety of phenomena in a rural setting. Such a comprehensive treatment would indeed be most desirable, but space and time limitations have made it impossible. Inspite of that an attempt has been made to consider (a) the studies which relate to essentially to the landform and settlement attributes and (b) the standard and scientific research methods (both qualitative and quantitative) which are essentially treated in landform and settlement studies.

At the outset it may be mentioned that the district (1 topo-
Graphical sheets have been divided into 6,940 grids each having an area of 1 Sq.Km (macro-level study) to study the morphometric attributes. In addition two police station maps (Salatoria and Patrasair police stations) on a scale of 1:8,000 (approx) have also been used for micro-level studies (case study areas).

Landform character of any region may be dismantled into a number of morphometric attributes, e.g. absolute relief, relative relief, roughness index, dissection index, drainage density, stream frequency, bifurcation ratio, slope and so on. Likewise the settlement of any area may be understood by studying different aspects of settlement i.e., density of settlement, types and pattern of settlement, population growth, occupational structure, size, spacing of settlement, nature of dispersion, siting and spatial distribution of settlement and so on.

It may be mentioned here that as a large area is to be covered (macro-level and micro-level studies) within a specified time, some limitations in regard to the selection of landform attributes and settlement attributes have been taken into consideration. Accordingly the landform attributes which have been taken into consideration in the present investigation include absolute relief, relative relief, dissection index, ruggedness index, slope and drainage density. Similarly, out of several settlement attributes (as stated earlier) only the distribution of settlement, density of residential houses, nature of dispersion of settlement and spacing of settlement are mainly considered in the present treatise.
It is worth-mentioning here that the present study is mainly based on topographical and police station maps - providing a base for the study of landform as well as settlement characteristics, which were supplemented by fieldwork - primary data (random sampling both at macro and micro-level studies).

In this connection it may also be pointed out that in the absence of the (detailed) census reports of 1991 (secondary data), the available reports including those of 1981 have mainly been referred to in studying settlement characteristics of the district. As the overwhelming majority of population (more than 92%) of the district live in rural surroundings, only the rural settlement characteristics are taken into consideration.

Finally, in finding out the quantitative relationship between landform and settlement in the district (macro-level study) only the three major morphometric attributes of landform i.e., absolute relief, relative relief and slope are considered whereas in case of police stations (micro-level study - case study areas) all the morphometric attributes (as stated earlier) have been taken into consideration.

1.5 STUDY AREA:

The area under study - the district of Bankura - is an identified backward district of West Bengal and is characterised with predominance of rural population (more than 92%) and agricultural activities. The district touches the latitudinal lines of 22°36'
North and 23°38' North and the longitudinal lines of 86°36' East and 87°46' East (Map-1).

The district has an approximate resemblance to an isosceles triangle with its northern apex at the junction of Barddhaman and Purulia districts with an irregular east-west base-line resting on Medinipur and Hugli. Lying between the rice-producing alluvial plain of Bengal to the east and the Chotanagpur plateau on the west, the district forms an intermediate tract stretching over an area of nearly 6,882 Sq.Km. with a total population of 2,374,815 persons (1981).

From the central part of the district, the ground surface rises gradually in western undulating plains, the elevations becoming more pronounced towards the west where the land is interspersed with hilllocks and broken up into low ridges and valleys. Towards the extreme north-west, the undulations become more pronounced as the Chotanagpur Plateau is reached.

Damodar, the most important river of the district separating it from the district of Barddhaman, flows along the northern boundary. The second important river is Dwarakeswar which flows approximately through the middle part of the district. The other major rivers are the Gandheswari, the Kangsabati and Silabati - all flowing from west to east.

The climate of the district is characterised by an oppressively hot summer, high humidity (nearly all the year round) and relatively scanty rainfall during the monsoon months. The winter starts from mid-November and lasts till the end-February.
The soils of the district include laterite and lateritic (west), red (centre) and alluvial (east). In general, the uplands, the hill slopes and the ridges are forest-clad (Dry Sal) while the lowlying areas and the gentle slopes with a deep soil cover have been brought under the plough.

The district of Bankura is dependent for its transport, more on its road network than on its railways. It is not served by any national highway, but some of the State highways pass through it. Railways provide important transportation facilities for goods and passengers. They play an important role in the movement of natural resources like timber, coal and mineral ores. The important centres with which the district has trading relations through railway traffic of goods are Calcutta, Tatanagar, Delhi, Cochin, Rourkela, Kanpur, Mirzapur, Cuttack, Ranchi and Raniganj.

Large-scale industrial units like sugar-mills, jute-mills, fertilizer plants are not found in the district. A few small and medium-sized industries have come up, which are mostly engaged in the processing of agricultural produce or engineering job work. In fact, cottage and household units constitute the basic framework of industrial activity in the district.

With its headquarters at Bankura, the district has two subdivisions (Sadar and Bishnupur), 19 police stations, 22 development blocks, 3,625 inhabited villages and three municipal and two non-municipal towns. The municipal towns are Bankura, Bishnupur and Sonamukhi, while Ahatra and Patrasait are the non-municipal towns.
1.6 METHODOLOGY:

The methods adopted in the present thesis are as follows:

I. Pre-field methods.
II. Field-work methods.
III. Post-field methods.

I. Pre-field methods.

The main objectives of prefield work are the systematic preparation for fieldwork and the acquaintance of the area in which the study is to be carried out from the existing reports and maps.

The essential requirements of the prefield work period are (a) the collection, (b) study and (c) interpretation of the available maps, literatures, government documents, census handbooks from published and unpublished sources in relation to the landform and settlement character of the district.

This stage of work includes the following phases:

(i) The collection and interpretation of the available literature and Survey of India topographical maps (1:50,000) relating to the study area are made.

(ii) The topographical maps (73\text{12}, 73\text{14}, 73\text{15}, 73\text{16}, 73\text{9}, 73\text{10}, 73\text{13}, 73\text{14}, 73\text{2}, 73\text{3}, 73\text{4}, 73\text{6}, 73\text{7}, 73\text{8}, 73\text{11}, 73\text{12}, 73\text{16}, 73\text{17}, 73\text{2}, 73\text{5} and 73\text{9}) on a scale of 1:50,000 form the basis in studying the distribution pattern of settlements and
the landform attributes of the district. Available police station maps (1:8,000), district maps, landuse, forest, irrigation and cultural atlases of National Atlas and Thematic Mapping Organisation, Government of India, Calcutta, are also used.

(iii) The toposheets are laid down as a mosaic.

(iv) The quantitative estimates of the individual physical attributes are made by standard morphometric methods by dividing the area under investigation (covering 21 toposheets) into 6,940 grids (1 Sq. Km).

(v) The settlement characteristics are noted from the available information and topographical sheets.

(vi) Case studies are planned for micro-level investigation. Satlora and Patrasair police stations are taken into consideration in this respect. The item number (iv) and (v) as stated above have also been repeated in the case study areas.

(vii) Base maps (both for macro-level and micro-level study) are finalised.

(viii) A questionnaire is prepared in regard to building materials, seasonal shifting, permanent migration and other demographic data etc. especially to study the human aspects.

(ix) A visual correlation between landform and settlement are identified.
II. Field-work methods.

The main purpose of this part of work is to evaluate the validity of the findings obtained through laboratory and the fieldwork. Owing to the large size of the district (6882.0 Sq.Km) a random sampling method has been adopted in the field investigation.

This stage of work includes the following phases:

(i) The landform attributes of the district as a whole and those of the case study areas are measured and assessed (random sampling) in the field by standard instruments as well as by field impressions.

(ii) Settlement characteristics of the area under investigation are noted in the questionnaire through personal interviews with the villagers.

(iii) The necessary changes of landform and settlement attributes as and when observed are noted for subsequent modification in the post field investigations.

III. Post-field methods.

In post-field work it is necessary to correlate the laboratory data with the field data and finally to establish the relationship between landform and settlement in the area under investigation.

This stage of work consists of the following phases:

(i) The data related to landform attributes are re-examined in the light of the experience already gained and data collected th-
rough fieldwork.

(ii) Data collected through field investigation and from questionnaire relating to different settlement aspects are processed and necessary changes are made.

(iii) A visual relationship between the different landform attributes and that of the different aspects of settlement of the areas under investigation (both macro-level and micro-level) as assessed earlier are now finally correlated with the findings of the fieldwork.

(iv) In addition, the standard quantitative methods are applied not only at the district level (macro-level) but also at police station levels (micro-level case studies) to find out the correlation between the landform characteristics and settlement characteristics in the areas under investigation.

(v) Finally, a report has been prepared on the basis of these findings and suggestions are given for future planning of the settlements in the district under investigation.