Chapter I

INTRODUCTION

The struggle for land, the right to use land, and the vicissitudes of man's relation to land, are ever-recurring features in the history of mankind. Land resources, the ultimate treasures by which a nation lives, are largely permanent and unalterable. Their reckless use leads to constant decline in the output of these resources and they lose much of their desirability in the changing circumstances. The complex, intricate pattern of land use or non-use in a densely populated area has evolved through the long continued operation of the whole range of environmental factors, mainly physical, modified by social, economic and historical forces. Whatever the reason for the present complex pattern, it is upon this that planning for the future must start.

Few relationships in life are more fundamental or more significant than that between man and land.¹ But to a geographer, "land means space of habitat rather the nature

itself, always active and having its own processes of
change, development and decay". One of the most serious
problems faced by the world-to-day is the rapidly increas-
ing pressure of population on physical resources,
particularly on resources of land. The land area is fixed
and inextensible while the population is increasing at a
rate never before reached in the world history. On the
whole, birth rates are tending to decline but the net rate
of increase is higher than ever before. It was the
advances in science and administration that caused the
dramatic decline in mortality, and it will be the task of
modern science and administration to provide the ever
increasing number of human beings in the world with suffi-
cient food and employment.2

For decades a race has been under way between
multiplying population and technological progress, which
will everywhere continue to gain momentum until socio-
geographical environment planning can help establish a
balance between increasing population and the exploitation
of available resources. With the increase of population,
the per capita share of arable land decreases and

2 Shafi, M. (ed.), Proceeding of Symposium on Land-Use in
Developing Countries, 21st International Geographical
Congress, India, 1968, p. 45.
3 Erich, H. Jacoby and Charlotte, F. Jacoby, Man and Land,
consequently, the days of large scale exploitation of land in
the old sense has been over. Despite hard labours the total
output of the crops needed by man is much below the require-
ment. Consequently a large section of mankind exist at a
very low level of living - the worst affected being the lend-
less agricultural labourers. Although the minimum require-
ment of dietary energy for each Indian on the average is
estimated at 2000 calories a day, the available quantity is
only 1901 calories. Whereas, in all except one of the 33
developed countries listed by F.A.O., more than 2500 calories
of 'dietary energy' are available per head per day. The low
caloric intake is the index of poor health and low standard
of living. "A hungry world is never likely to be a peaceful
world". This has stimulated researches on the problem of
fighting the onslaught of hunger in the different branches
of knowledge which directly concern man and his betterment.
The need for such researches becomes all the more imperative
in a region like ours where the available land for agricul-
ture is limited, the productivity is low and 70 per cent of
the total population is directly dependent on agriculture.

The important holistic aspect of the problem is
the determination of appropriate man-land ratio that would
fit in with the optimum production of adequate foodstuff

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and other requirements. It is most important to work out as to how much land would be required to produce the adequate diet requirement for the population of a region under the prevailing climate, physiography and food habits of the people. The solution of this problem lies in a proper and optimum utilisation of physical resources, particularly of the land.

In most of the developing countries there is an urgent need to extend and improve the exploitation of land resources, that is to obtain the maximum output of crops, livestock and timber, and at the same time to ensure that the productive capacity of the land is augmented rather than depleted. This calls for surveys of lands and peoples in different areas to serve as a proper foundation, for the planning and development of a country or a region is possible if only the planner knows the position of the land, its behaviour and character.

It is with this point of view in mind that the present work has been undertaken. The current problem of Manipur, like any other part of India, is one of increasing pressure of population on limited land. It is to be noted that the Manipur valley is one of the areas of densest rural population with purely agrarian economy. The valley has an
area of 2,639.757 km\(^2\) which accounts for 12 per cent of the total area of the State of Manipur. But as many as 7,46,776 persons (1971) live in this comparatively small valley accounting for 69.6 per cent of the total population of the State. The arithmetic density of the valley thus stands at 283 persons per km\(^2\), while physiological density is 778 persons.

The agriculture in the hills is still primitive. Shifting cultivation is in vogue, while terracing is limited to a few localities. With this lamentably backward agricultural basis the hills can hardly support the population living there, who have to depend heavily on the valley for food supply. To add to the pressure on land there has been a continuous immigration of persons from outside, especially of the Nepalis who settle in both the hills and plains of Manipur. The valley is thus subjected to ever increasing human pressure with no attention paid to land-resource planning. It is, therefore, deemed necessary that a diagnostic land-use survey is made on the basis of which land-utilization planning can be taken up. The survey of land utilization becomes all the more important in a country where agriculture is the mainstay of the population, and yet the country suffers from food shortage. The area will not increase, while the population is inherently unlimited and is increasing fast. Hence, the aim of a land
use survey is to ensure that every available piece of land in a region is used scientifically to the best advantage in relation to its intrinsic qualities that spring from its natural and cultural environments. While the physical factors have been dominant in determining the general land use pattern of the Manipur valley, there are many cases where historical accidents of ownership and tenure have also been the determining factors.

A REVIEW OF THE SIMILAR WORKS DONE:

General Review:

Many eminent geographers and scholars have long devoted to the study of the problems of land-use in different countries of the world with a view to finding out existing maladies and potentialities. The term 'land-use' may broadly be defined as the putting up of a parcel of land into productive purposes. The study is as old as agriculture itself. Written records of formal study of land-use are available from as early as the eighteenth century. These ranges from inventories and land-use surveys to isolated topical or regional descriptive accounts both in space and time. It is interesting to observe that most of the physiocrats' views were mainly related to the agricultural land, because in an agricultural society cities were unimportant in the landscape and viewed as parasitic on the
vast agricultural region. This nonconcern for urban land continued until in the late nineteenth century. But, today if we look in a broad perspective, we will find two distinct areas of land-uses viz. rural and urban. A torrent of literature is devoted to these and similar topics, some of it is dull some brilliant.

At the beginning of the nineteenth century David Ricardo (1819) presented a treatment on agricultural rent which is still the foundation of most of the present-day theories on land-rent. He pointed out that the most fertile lands were the first put to use, and that less favoured lands were put to use as the demand for agricultural products increased. A few years later Von Thünen (1826) developed the theory of location on differential rent more fully. His theory had been developed more meaningfully by Dum (1954) and Isard (1956). Mill (1848) defines the nature of wealth and the laws of its production and distribution in his publication entitled 'Principles of Political Economy'. Alfred Marshal's (1890) land rent theory is essentially Recordian with a leaning towards Mill's alternative use thought. But he broadened the rent concept by distinguishing "quasi-rents" that is temporary differentials arising from natural advantages possessed by any concrete agent of production. The theories noted above were some of
the forerunners of the studies of land-use (primarily agricultural) and these studies still serve as the foundation of most of the present-day works. The differences of fertility in the productivity, heterogeneity of land, costs of friction, of space, site and rent were some of the basic assumptions adopted in analysing the studies of land-use.

At the beginning of the present century, activity in this field passed to America. Hurd published a book entitled Principles of City Land Values in 1903 and outlined a theory for urban land-uses based on the assumptions made by Thumen for agriculture. A large number of books have been published since the 1920's on city planning. Side by side with this, there came out books relating to land economics. A very important contribution to urban land-use was made by Robert (1926) in his article 'Towards an Understanding of the Metropolis'. Parallel to the development of the literature in land economics there has developed a literature in human ecology which also concerns itself with urban land values. In a seminal book in this

5 Richard, M. Hurd, Principles of City Land Values, New York, 1903, pp. 11-78.


discipline, Park and Burgess (1925) stated, "land values are the chief determining influence in the segregation of local areas and in the determination of the uses to which area is put". Brinkmann (1957) and Wingo Jr. (1961) have developed these ideas in a more modified and clear perspective. Recently, the studies are directed towards the application of quantitative techniques in the analysis of various land-use components. Kostrowicki's land-use orientation (1960-65) represents the mechanism, distributive system and consciousness of relative direction in land-use pattern, which is resultant of various physio-socio-cultural environments, though the physical impact remains relatively higher than the socio-cultural influences.

Dynamic studies of land-use becomes more important, especially after the contribution of Baker (1923) in the United States, Stamp (1930) in Britain and Lossing Buck (1937) in China. But the real development in this direction started with the establishment of British Land-Use Survey in 1930 under the Directorship of Late Stamp and Willatts as


Organising Secretary. The British Land-Use Survey Department has created a good impact on the country by solving the agrarian problem during the First World War. This gave impetus to the geographers to establish a commission on the world land-use survey at International Geographical Congress, Lisbon in 1949, under the Chairmanship of Valkenburg. This survey proposed a scheme for the delineation of land-use classification on an uniform scale for all the countries of the world (Stamp, 1949). In a report presented to the eighteenth conference of the I.G.U. at Rio-de Janeiro (1956), it was recommended to set up a commission under the Chairmanship of Stamp to organise a land-use survey in all parts of the world. The Food and Agricultural Organization of the United Nations collects land-use figures from member countries and publishes them annually in its production yearbook. These data include figures on the total land area, arable area, permanent pasture, woodland, and areas given to other uses in each country.


Studies in India

The problems of land-use in India have been studied by eminent geographers of the country since 1940. Previously, most of the studies of land-use were in fact descriptive accounts of spatial variation of crop and their distribution. Later, the studies are turning towards the application of quantitative techniques in the analysis of various components of the land-use.

Chatterjee in 1941\(^\text{12}\) appealed to all the geographers of India to undertake a land-use survey of the country. Sensing its necessity Shafi (1951)\(^\text{13}\) made a strong effort to carry out a land utilization survey combined with land capability survey of the country. Following this, land-use surveys were carried out by the students of the Department of Geography, Aligarh Muslim University (1956), Madras University and Calcutta University in different areas of the country. A note by Gupta (1956)\(^\text{14}\) explains the methods of rapid land-use survey which have been adopted by the National Atlas Organization under the Directorship of Chatterjee.

\(^{12}\) Chatterjee, S.P., 'The Place of Geography in National Planning', Calcutta Geographical Review, 1941, p. 3.

\(^{13}\) Shafi, Md., 'A Plea for Land Utilization Survey', Geographer, 2, 1951, p. 4.

Chatterjee\textsuperscript{15} (1953, 1956, 1962) repeatedly discussed the necessity of land-use survey covering the whole of India. He did not favour much reliance on sample survey in a vast country where varied physical conditions prevail. Prakas Rao (1956)\textsuperscript{16} on the other hand emphasised the need to carry out pilot studies in typical land-use regions and also evolved a scheme of land-use classification and its mapping. Indian Society of Agricultural Economics brought out the 'Readings of Land Utilization' (1967) as one of its publications. It discusses many approaches to the problems of land utilization, its scope and methods and describes some important projects which have been carried out on land utilization in the world. The extent of land misuse in India has also been discussed and problems that may arise in the formulation and execution of

\textsuperscript{15} Chatterjee, S.P., 'Land Utilization Survey in India', Observer, 1953, P.1.

National Land Policy' have been enumerated. Sen and Chakrabarty (1956) have given the significance of mapping correctly through the technique of colour scheme for land-use maps. Deshpande, Bhat and Mavinkarve (1959) have emphasised the influence of morphological features on land-use and have suggested a micro-regional approach to land-use planning. Rao and Bhat (1959) have pointed out that geographers can contribute meaningfully to land-use planning as they are well trained for "regional synthesis" through map interpretation.

Meanwhile, many geographers have come forward with descriptive studies which range from local case-studies to regional evaluation of land-use problem. Chatterjee (1943) has selected a small area to study the influence of physical environment and socio-economic factors of utilization. It

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was followed by Siddiqi's\textsuperscript{21} (1946) studies in the Central Ghaggar Plain. Damodor Valley Corporation\textsuperscript{22} (1951) has also attempted an outline plan of improved land-use for the area under the project. Chatterjee again (1952)\textsuperscript{23} has tried to find out the location of idle land after studying the nature of utilization of each holding in the Howrah District. Such kinds of studies have been followed by these of many other geographers namely Halge, Honrao\textsuperscript{24-25} (1953-1962), Ganguli\textsuperscript{26} (1953), Singh\textsuperscript{27} (1955), Ahmad\textsuperscript{28} (1959), Arunachalam\textsuperscript{29} (1959).

\textsuperscript{21} Siddiqi, Land Utilization in the Central Ghaggar Plain. Unpublished Doctoral Thesis Aligarh Muslim University, 1946.

\textsuperscript{22} Damodor Valley Corporation, Improved Land-Use in the Damodor Valley. Calcutta 1951.

\textsuperscript{23} Chatterjee, S.P., 'Land Utilization Survey of Howrah District', Geographical Review of India, 14, 1952, p. 3.

\textsuperscript{24} Halge and Honrao, 'A Study on Land-Use in North Konara Coastlands', Bombay Geographical Magazine, 1, 1958, p.1.

\textsuperscript{25} Honrao, M.S., 'Land-Use Patterns in Lower Keli Basin', Proceedings of the Summer School in Geography, Sinala, 1962.


Despande\textsuperscript{30} has brought out the influence of soil, drainage and irrigation on the utilization of land (1959). Shafi's (1960)\textsuperscript{31} studies are based on strenuous field works and selection of villages from varied environments in which actual land-use is plotted on maps and accurate yields ascertained. Various kinds of land-use studies based on case-studies have been produced by geographers like Bharadwaj\textsuperscript{32} (1961-64), Roy\textsuperscript{33} (1961), Duggal\textsuperscript{34} (1961), Joshi\textsuperscript{35} (1961), Chandrashekar and Sunderam\textsuperscript{36} (1962), Raina\textsuperscript{37} (1962-63).


\textsuperscript{31} Shafi, M., Land Utilization in Eastern Uttar Pradesh, Aligarh, 1960.


\textsuperscript{33} Roy, B.K., 'A Sample Study in Land Utilization of Five Villages of Ballia (U.P.)', National Geographical Journal of India, 7, 1961, p. 4.

\textsuperscript{34} Duggal, S.L., 'The Historical Factor Governing the Land-Use Pattern in Moradabad District', Indian Geographical Journal, 1961, 7, p. 4.


Md. Shafi (1961-66) again discussed the problem of field studies in the Indian context and advocated the adoption of a "purposive sampling technique to select areas of special study". After briefly reviewing various techniques adopted in different countries, he opines that any...
technique which is adopted for the "rural land-use planning in India should aim at recording the existing use of land in the first instance followed by mapping of land capability or land potential at the next stage". In view of the vastness of the country, paucity of trained personnel and extent of time and expenditure involved, it will not be possible to cover whole of India by a "total survey". In order to avoid this difficulty, he has advocated the use of "systematic purposive cluster sampling" as the most suitable method for land-use survey in India. 46

Another valuable addition to land-use studies in India was recently made by the Indian National Committee for Geography in the form of a volume, 'India: Regional Studies', which outlines the regional personality of different parts of the country by focusing attention on the synthesis of the "physico-cultural environment" and "rural agrarian base". This study was followed by those of Bhattacharyya (Land-Use and Food Problems in West Bengal 1968), Choudhury (Land Utilization in Ken-Tons Doab of Uttar Pradesh 1969), Miyogi, Ghosh, Mallick and Sarkar (Geomorphic Control of Land-Use in


Geographers have recently turned their attention to assess "quantitatively" the changes which have been taking place in the utilization of land. Chakraborty has given a statistical method to analyze land-use pattern of any region. Shafi (1965) has selected Ganga - Yumuna Doab for his intensive study of "crop land-use pattern" and mapped and discussed "crop ranking". Various statistical approaches to the study of crop regions of Madhya Pradesh have been applied by Ayyer (1965). Besides reviewing other methods, he has also given his own "maximum distance method".

to group important crops in association. Ahmad (1966) has measured the productivity and farming efficiency in Bijnour District on the basis of land utilization statistics and yield of crops in a village. Singh (1967) has found significant changes in cropland-use pattern in Rechhwa after analysing the data of three basic years (1839-40, 1880-81 and 1959-60).

While considering the recent developments in the application of quantitative techniques to land-use studies, mention may be made of Siddiqi (1967) who has reviewed the methods used in crop combinations and tested their applicability in the Indian condition. Ahmad and Siddiqi (1967) have applied Doi's formula successfully in the study of crop land-use in Luni Basin. Amani has studied the changes that


have been taking place during the period of forty years (1926-27 to 1966-67) and has indicated that the present pattern of land-use reflects a long process of interaction between the physical and socio-economic factors. In his opinion, any study to interpret the existing land-use should be based on thorough inquiry into various forces that have been acting over time (1968-69). He has shown statistically the correlation of rainfall and cropped-land. Mukherji (1968) has brought to light the fact that there is a shifting tendency in agricultural pattern from multi-culture to micro-culture in Howrah District.\(^\text{54}\) Khan (1968) has highlighted the role of socio-economic factors like price incentive in the changing patterns of land-use in Bareilly District based on an analysis of five sample villages.\(^\text{55}\) Singh (1970) has studied the Land-use Patterns in Mirzapur and Environs and his study involves measurement of land efficiency and classification of the different categories of land in the area through village-level survey.\(^\text{56}\) Siddici (1971) has developed the method of Unit

\(^{54}\) Mukherjee, S. N., 'Changing Land-Use Pattern in Howrah District', Geographical Review of India, 1968, p. 43


\(^{56}\) Singh, V. R., Land-Use Pattern in Mirzapur and Environs, Banaras Hindu University, Varanasi-5, 1970.
area" land classification. This method of land classification was developed by the Tennessee Valley Authority (TVA). In this method factors relating to "physical and human environment" are tabulated through quantitative land classification and deductive method of land classification.  

In 1972 this method of study was conducted by Aparna Roy and Majid Hussain in their case studies. De (1973) has developed the method of measuring "Land Potential" through modern techniques like "Remote Sensing and Aerial Photo-interpretation and Geomorphic studies". Gautam (1976) has studied land-use and reveals that a comprehensive land development planning needs a "multi disciplinary" approach, where specialists in various fields need to analyze a bulk of data in order to arrive at an "integrated plan". According to him, a concerted effort of a number of disciplines can only reveal a variety of information necessary for land-use planning. He has advocated that photo-interpretation techniques can be used as a tool for data acquisition. 

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Studied Undertaken in Manipur

No systematic study of land-use in Manipur has so far been done. Land utilization data are not maintained for the State as a whole. But some data are, however, available in respect of the valley where piece-meal cadastral survey has been undertaken. The valley area consisting about $\frac{1}{12}$ of the total geographical area of the State was the "reporting area" till 1963-64. There appears to be no system for up-to-dating land records with the result that systematic data for land utilization are not available for the last several years. Thus the absence of complete and reliable statistics about land-utilization records, crop pattern and agricultural practices is a major handicap in the process of evaluating land and land potential. Information gaps still exist, particularly with regard to the crucial issues of population growth, land-tenure, and the financial and technical problems of rural development.

Some of the studies of late however, have mentioned a few information relating to the problem of land-use in Manipur. Government publication such as 'Techno-Economic Survey of Manipur' $^{60}$ (1961) and 'Agricultural Census of

Manipur (1970-71) have mentioned the information in a nutshell relating to land-use in Manipur. Ansari also mentioned the similar information in his doctoral thesis entitled 'Economic Geography of Manipur' (1973). Recently, AVARD, a quasi-government organisation, has studied some of the villages of the Manipur valley in their rural development and planning programme and their findings have been published in the "Meitei villages : Imphal East Block ; Manipur" (A Micro-level Planning studies 5, 1976).

SIGNIFICANCE OF THE STUDY

The study of land-use outlines the manifold uses of the land resources by man. Man experiments himself in the changing environment. He has been using the land from one primary use to another general use. He cleared the forest for shifting cultivation and then used the land for large-scale farming, small-scale farming, intensive farming, mixed farming, dry-farming, etc. He has used the land for one crop or a large number of crops. In this process man uses,


misuses, underuses and overuses the land. "Trial and error method leaves its trace of success and failure". Ever increasing population requires revision of land utilization plans. There are at least six vital needs of man which involve the use of land for their satisfaction. We may list them as food, shelter, work, recreation, movement and security. Whenever population is dense, these become competing demands. In the context of these needs, an analysis of the existing land-use of the Central Manipur Valley with regard to physical, climatic, biotic and economic environs will be, it is hoped, highly useful for the purpose of future land-use planning. It is through such studies that the region may be understood more clearly and measures may be suggested to turn it into a more productive one.

In the studies of land-use the idea of land conservation is taken as the outstanding concept. Land conservation means using land to the optimum extent so as not only to get the optimum benefit of the resources but also to preserve it as much as possible in an unhampered efficiency for the prosperity.

It is found that the statistical data and past records of land-use of the area are unsatisfactory. No comprehensive land-use survey of the State has so far been undertaken and the figures on trends are required to be collected from a variety of sources, all of which are not compatible. It is
in this context that this work has been taken up to establish a systematic correlation between the past and the present conditions of land resources and to predict the land potentials for future uses. In a State like Manipur whose economy is chiefly agricultural, the utility of reliable, comparable, comprehensive and consistent statistics for the purpose of perspective land-use planning and development need not be reiterated.

OBJECTIVE OF THE STUDY

The primary objective of the study of land-use in the Manipur valley is to record the existing land-use and also to carry out a general survey of the area to sort out manifold problems of land-use. Each problem will be guided for tentative land-use planning. It is the desire of the author to find out the cause and effect of poverty in a fertile valley. It is also the desire of the author to analyse the existing land-use pattern and find out the inherent cause which has rendered the area less productive. Among the various causes of the low yield of agricultural products, the most potent one is our faulty and haphazard land utilization. Unless we tackle the problem of misuse of land with determined efforts and evolve a healthy and balanced land-use policy to form the basis of all our plans for food, the problem will remain difficult. There is a need to increase the agricultural
production to keep pace with the increase of population. It is only through the scientific and balanced use of land, that we can hope to increase and maintain the yields from the land. This balance can be achieved only from a thorough land-use survey.

The physical factors affecting land-use, i.e. relief, slope, drainage, climate, and soil, would be carefully studied and on the basis of these factors the area will be sub-divided as far as possible into homogeneous sub-regions.

Once the quantitative and qualitative picture of the area is made available, the users of land can transform their idle land into productive and dynamic uses of land with the least effort. So the great need of the moment is to carry out a land utilization survey to ascertain the present use and misuse of land. It would be necessary to look into the causes as to why a particular piece of land is not cultivated, and also to determine what facilities would be needed to bring it under cultivation. Without such survey it is not possible to indicate the exact extent of land that can be reclaimed. The study will imply that we have to bring additional marginal land under cultivation, to save the land from the menace of soil erosion, to increase the yield/hectare, and to maintain a balanced development of land-use pattern in the valley and its adjoining areas.
This fact can be accomplished only when a systematic land-use study and intensive land-use survey is carried on. Such a survey is possible only if the statistics regarding the total area of the valley under cultivation and cultivable areas are accurately known. It will also provide information as to why there has been high pressure on certain areas of the valley, while some parts are left unused, and under what condition the unused areas can be brought to dynamic uses. The problems mentioned above lead to the hypothesis that the pressure on the limited areas of the valley of Manipur is very high. But it is believed that a scientific and detailed study can help in formulating plans for optimum use of land in the Manipur valley.

METHODOLOGY

The methodology adopted in this work may be grouped under the following heads:

1. Pre-field methods,
2. Field methods, and
3. Post-field methods.

1. Pre-field Method: At the beginning of this study the author engaged himself in reading relevant books, journals, research papers and unpublished theses related to agricultural geography, land-use problem and land-use planning, revenue
reports and administrative reports of Manipur. Secondly, the author studied the toposheets, village revenue maps and cadastral maps of the area concerned. By applying the above-mentioned methods the writer has acquired a sound theoretical knowledge of the problems and prospects inherent in the land-use of the valley. In collecting data the author had to depend largely on the such sources as sample survey, application of questionnaire, etc. The selection of villages and households for sample surveying and preparation of questionnaires had been completed before field work was undertaken.

It is intended to study the pattern of land-use in the rural, peri-urban and urban areas and hence territorial revenue units of these three kinds have been selected. At the first stage, out of the eighteen notified areas, five urban centres (27.8 per cent) have been selected through random sampling. These selected urban centres are (3) Imphal, (16) Sengmu, (12) Nambol, (18) Yairipok, and (11) Mayang Imphal.

Around the selected urban centres, peri-urban and rural villages have been selected by the same process. Among the urban centres Imphal is the one having thirty-two revenue villages. That is why the author has selected only five i.e. 13 per cent of the town areas based on purposive sampling. In the peri-urban of Imphal there are eighty-nine villages and of them eight (15 per cent) have been select both from Imphal
East and Imphal West sub-division. To have an equal representation from each sampling urban centres, the author has selected rural villages from four newly developing small towns. Thus altogether the number of sampling villages are forty-nine (7.6 per cent) out of five hundred and forty-four villages of the Manipur valley.

2. Field Methods: Although aerial photo-interpretation and remote sensing techniques have proved more useful in the systematic studies of land-use and land potential classification, yet the author cannot put these techniques to use. Therefore, the technique for land-use study and land classification has to depend upon the data obtained from traditionally available materials.

The present work includes a number of field studies and intensive surveying at various micro-levels. To investigate the dynamics of land-use orientation, a micro-level study, mainly, based on a technique of systematic purposive cluster sampling based on stratified randomization in the area (Manipur valley), has been adopted for analytical purposes. The stratification has been done after a detailed study of physiographic features of the valley. On the basis of these factors, the area is again sub-divided as far as possible into homogeneous sub-regions. From each sub-region, representative villages are selected and these include a cluster of fields.
The surveyed areas were so selected as to represent all sorts of physico-social environment, such as (i) areas in and around water bodies such as lakes, swamps, etc., (ii) areas along the river channels, (iii) areas away from both water bodies and river channels, (iv) areas around the foot-hills, and (v) areas along the national and state highways. Subsequently in each sample village a simple stratified random sampling of 15 per cent of the household has been drawn. The sample household schedules were filled in accordance with the information given by the head of the household. Data of land-use, land-records and cropping patterns were obtained from the offices of the District Commissioner, the Sub-divisional Office, and Block Development Offices, etc.

3. Post-field Methods: After the analysis of the data collected, the percentage of the total area under the role of land-use dominance have been produced according to ranking order. In general, orientation has been classified according to the method as presented in table 1:1 which determines the nature and role of land-use. Area contributing less than 20 per cent are not considered. A symbolic nomenclature is given to each land-use orientation using the first letter of land-use category i.e. A = Arable, F = Forest, P = Pasture, B = Barren land, S = Settlement, V = Vacant land and F = Fallow, etc. They have been grouped in to a formula where
the letters represent the land-use and the figures represent their ranks. 64

### Table 1.1

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<thead>
<tr>
<th>Area in Percentage</th>
<th>Role</th>
<th>Rank</th>
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<tbody>
<tr>
<td>Over 80</td>
<td>Dominant</td>
<td>4</td>
</tr>
<tr>
<td>60 - 80</td>
<td>Predominant</td>
<td>3</td>
</tr>
<tr>
<td>40 - 60</td>
<td>Equidominant/Semidominant</td>
<td>2</td>
</tr>
<tr>
<td>20 - 40</td>
<td>Accompanying</td>
<td>1</td>
</tr>
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After field verification and collection of necessary data and after analysis and synthesis of the collected data, generalized land-use maps have been prepared. Consequently, the author has to classify the area according to the above-mentioned orientation method. Then the area again has been classified according to potentialities and cropping patterns, etc. All the significant regional components have been mapped and examined for further uses. Land under proper use, and misuse has been tabulated and calculated separately. This is done in order to find out man-land ratio as also to assess the socio-biotic factors affecting land-use.

64 Kostrowicki, J., 'Some Methods of Determining Land-Use and Agricultural Orientations as used in Polish Land Utilization and Typological Studies', *Geographica Politica*, 16, 1965, pp. 95-120.
FORMAT OF THE THESIS

The work has been divided into three parts namely the introductory, analysis and synthesis parts.

The first part includes two chapters of which the first one with the orientation of the topics and an introduction to the research problem undertaken. In the second chapter attempt has been made to identify the ecological setting of the Manipur valley by examining the elements like physiography, climate, soil, natural vegetation and the people of the area.

In the second part, chapter III deals with the evolution of land-use. It also deals with the spatial and temporal change in the land-use pattern of the valley. It is through this perspective that the present pattern of land use has been unfolded. The present tenancy system and land classification of the valley area have been outlined in chapter IV where due emphasis has been given on physical as well as cultural and economic aspects. Chapter V deals with the existing land-use pattern of the valley area with due emphasis on crop relation and use of land for purposes other than agriculture as we find to-day. In the sixth chapter an attempt has been made to focus various problems of the land-use through 'case studies'. Chapter VII is devoted to finding
out land capabilities of the sampling areas using regression analysis suggested by the author. The pattern of land-use of the sampling areas in the context of capability classes has also been considered here.

The third part contains two chapters namely eighth and ninth. Chapter VIII mainly deals with land-use planning. It is divided into two sections. The first section discusses the problems like the pressure on land, distribution of population, density, trend of population growth, man-land ratio, employment, income, occupation, animal pressure, etc. The potentialities like land reclamation and crop rotation etc. have mainly been discussed in the second section of this chapter.

The concluding chapter i.e. chapter IX deals with the summary of the work and prognosis of the land-use in the context of a systematic planning. It is suggested that such a planning alone will give optimum benefit in so far as the land-use of the valley is concerned. This chapter also includes the terms and terminology, appendix and a comprehensive bibliography.