# CHAPTER I

# INTRODUCTION

# CHAPTER-I

## INTRODUCTION

1. The present work "Dynamics of Land Use in Bara Tract of Jambusar Taluka, District Bharuch" is a study of the changes that have taken place in general and cropland use of the forty-six contiguous villages (Fig. 2) situated in the eastern coastal zone of the Gulf of Khambhat between the estuaries of River Mahi in the north and River Dhadhar in the south. This segment is locally known as Bara Tract of Jambusar. It is essential at the outset to define the term 'land use' and explain the term 'dynamics'. These two together form the core of this study.

### 1.1 MEANING AND DEFINITION:

#### 1.1.1 Land Use:

The allocation of land for various human activities competing for it is one of the most basic geographical problems (Conkling and Yeats 1976, p.8). The land use is the behavioural function of human being changing according to the changing situations with an anticipation of the advantages. Land use, therefore, indicates a kind of economic concept that denotes two types of functions performed by man; one is in space, and the other is in quality. Space gives the location of activity and quality gives the types of use. Thus, land is any kind of permanent or cyclic human intervention to satisfy human needs, either material or spiritual or both from the complex of natural and artificial resources which together are called "land". (Vink 1975, p.1). He further states "land carries ecosystem; land use is the application of human controls, in relatively, systematic manner, to the key elements within any ecosystem, in order to derive benefit from it".

The term land use and land utilization, as suggested by the Oxford Dictionary, are synonyms. The Longman Dictionary

of Geography, and in many other texts these two terms have been used interchangeably. However, some scientists have attempted to make a subtle difference between the two, as they were of the opinion that institutional factors should not be included in land use, but in land utilization (Vink, p.2). But Vink (1975) is of the opinion that "Land as a tract" i.e. as a geographically defined specific area, does include the permanent or cyclic institutional attributes. He further says that "A rural land use in its widest sense is including agriculture, forestry and game cropping as well as wildlife conservation and the development and management of recreation grounds. In this sense, therefore, both terms are used interchangeably by him. The present study also uses the term in the same way.

### 1.1.2 Theory of Land Use:

Land use is categorized in both productive and non-productive functions. Being one of the primary factors of production, land performs dual function as a space, and as a resource. All human activities are performed on the land. Notable differences are found in the patterns of rural and urban land uses. The productive and non-productive occupance of rural land are complimentary to each other. The size of the non-productive uses of the rural land, as against urban land, is smaller than the productive uses. The rural farms occupy large extents of land relative to other factors of production (Conkling and Yeates 1976, p.10). Most forms of primary production in rural areas are extensive in their uses of land. Rural land use theory reveals a system of uses of land which involves the basic requirements of man and in itself occupies a basic minimum area (Ibid). Varied uses include: (A) Land available for cultivation which includes the net or total sown area, the cultivable waste and fallow land. Usually, this category (especially N S A) occupies the highest percentage of the total geographical area of any village; (B) Land not available for cultivation, which includes the permanent pastures and grazing land, the water bodies, the settlements, roads and a few other uses. Their percentage share in total area is usually much smaller than that of category 'A'.

The classical theory of land use propounded by Von-Thunen (1783-1850) establishes that the primary productions are intrinsically market oriented and change according to increasing distance and increasing cost of transportation, thus, the intensity decreasing with increasing distance from the centre. So he set out to determine the role of distance in forminng the rural land use patterns. Though, this theory was based on the situations prevailing during the time of Von Thunen, it holds its merit in certain cases even today . An attempt will be made to test this model (if necessary)in the light of the situations prevailing in the study area.

### 1.1.3 Land-Use Dynamics:

According to Vink (1975, p.1) land use itself is a dynamic concept. It changes with the passage of time and also with the changes in the processes of intervention by man. Since the forces, factors and phenomena are hardly stable at any place on the earth, the use of land hardly bears stability. The land is the maker of the ecosystem and itself is a part of it. (Vink 1975, p.1). The various components of the ecosystem have some degree of permanency unless intervened by man or become subject to any natural catastrophy. Each element and element complex composing the environment exerts deep influence on the man's interaction with land. These forces have decided the past, devised the present, and, to some extent, define the future uses of land. A host of natural and cultural factors are responsible for shaping and reshaping the patterns of land use on any geographically defined specific area.

Compared to agricultural land use, the general land use is less changeable, e.g., the land under non-agricultural uses such as the pasture and grazing land, the water bodies, tanks and ponds, the settlements, burial and cremation grounds, roads etc., show less changeability unless any natural, cultural or economic interruption takes place. However, the land use, whether undergoing fast or slow changes is a dynamic rather than a static concept. The term dynamics belongs to the science of Mechanics. It deals with the matter in motion (Kinamatics) and the forces that produce or change such motion (Kinetics). In short it may be defined as the science that deals with the forces which set any matter to momentum, and or change them from their previous positions.

In this sense the term dynamics may be used for the purpose of understanding the level of changes in any branch of study e.g., dynamic equilibrium, dynamic geology, dynamic lapse rate, dynamic spatial model and all land use changes and the patterns produced by these changes, and the processes causing these changes over time. It includes spatial changes, changes in pattern and changes in productivity (Longman). When applied to land use studies the dynamics of land use would mean the changes taking place in land use and its systems by the intervention of the physico-cultural forces over-time. The changes may be for the better or for the worse depending on the situations and the levels of intervention by nature or by man. The task of the students of this aspect of land use is to measure the levels of changes and identify the forces responsible for it.

## 1.2 SIGNIFICANCE OF THE STUDY:

The present study of the Bara tract of Jambusar is an attempt to understand and interpret the changing relationship between man and environment. The study would, therefore, bring to light the little known land use practices of the area as no intensive geographical study of the area has been made till this date. The Narmada Planning Group conducted a variety of studies in the Narmada Canal Command Area, of which this area is a part. Extensive soil, rainfall and cropping pattern surveys have been completed, but all were done from the engineering and planning points of view. The Department of Geography of the M.S.University of Baroda conducted a land use survey and mapping of Narmada Command Zone 4 (A & B). But that study was to understand the land use situations over a period of three years (1979-80, 1980-81 and 1981-82) of which the average was worked out, and large scale maps were prepared. The study was aimed at understanding the present trends and the future prospects when Narmada Canal would be commissioned, and the area would be getting sufficient water at its disposal.

Bara tract is georaphically a problem area. Its climatic conditions, particularly rainfall, is quite erratic. It is observed that almost every third year is an year of scanty rainfall. The

underground water table is not much deep, and the acquifers are useless for drinking and irrigation as they have very high ratio of salt as compared to the tidal water stored in the saltpans. So, neither the vast resource of the gulf water nor the underground acquifer has any irrigational value for the agriculture of this area. Rains are, therefore, the only source. If normal rains are received in full (between 20-25 inches : 500-625 mm) at regular intervals of 15-20 days, it makes a very promising cropping season. But with the erraticity of rains, crop failures and drought are a common phenomena in this area.

Looking into the nature and scope of this study, it can prove to be of great significance in view of the current emphasis on rural development planning. All planning exercises start from a knowledge of the present condition and from appreciation of the existing trends of development in its various manifestations. The present study will give a factual account of the existing land use and agricultural situations of the area which will serve as the solid background for physical planning in general and land use and cropping planning in particular. The study of the changes in the land use and cropping patterns during the past twenty years will indicate the trends in land use and agriculture. The planners may take a clue from this and plan their strategy accordingly checking or changing the undesirable trends in land uses and giving a push to the desirable ones. This way, the present study will be of great significance for the planners and administrators concerned with the development of this problem haunted rural area of Gujarat. Besides, it may also serve as a guide to planners in similar saline areas along the western coastal belt of Gujarat, and Maharashtra and similar areas elsewhere in the country.

## 1.3 CHOICE OF THE STUDY AREA:

The study area is interesting from the geographical view point. The environmental determinism has for long been a matter of hot debate between the various scholars of different schools of thought in the Western world as well as in India. Many merits and demerits of this concept have been noted, and many for and

arguments have been extended. A host of possibilistic measures have been adopted to minimise and/or nullify the influence of determinism in different parts of the world, and also in India. But these measures have not been equally distributed all-over and equally enjoyed by all sections of the society. Certain areas, even in the highly developed states, have been reeling under the acute state of determinism, awaiting the benevolence of nature for most of their situations even in this modern period of man's increasing control over nature. Bara tract, as perceived by the present researcher, is one of such unfortunate areas of the Progressive State of Gujarat. The Narmada Planning Group (N.P.G.), in their schematic zoning of the Narmada Canal Command Area, have placed this area in Zone 4-B and have categorized it as a "Problem Area".

Having visited the area under the acute rainless situations, acute shortage of drinking water and helpless situations for the inhabitants, the researcher developed an interest to take up the task of studying the dynamism of the area's rural land use within the constraints of the natural environment, and the human inter-action with it. The study acquires added significance in view of the fact that the land use of the area is likely to change drastically with the commissionng of the long awaited Narmada Canal.

## 1.4 CHOICE OF THE TIME FRAME:

It is necessary also to explain the reasons behind the choice of the time frame of the study. The two points of time 1959-60 and 1979-80 are selected to study the changes in a span of two decades.

The significance of 1959-60 is that it was the eve of the bifurcation of Gujarat State on linguistic basis from the greater Bombay Province (1st May 1960). It is aimed at understanding the pre-bifurcation land use patterns of the study area. Further, to understand the changes in the land use patterns of this area over a period of two decades, 1979-80 has been chosen. Since Gujarat is one of the most dynamic states in India in respect of almost all spheres of economic development, it is to see as to how the land use patterns have been influenced by the dynamic and

developmental attitude of the State. This particular year also bears the significance that it marked the end of the Fifth Plan period (1979-80). Agricultural development, rural and small industries and land use were given priority. The yearly rolling plans were the part of the Sixth Plan which were supposed to have been largely influenced by the Economic Policy of the Janata Party (Benerjee 1988, p.187). Also, the year 1979-80 happened to be the preceding year of the Sixth Plan (1980-85) under a changed Government.

## 1.5 OBJECTIVE OF THE STUDY:

Socio-economic development is a global phenomenon in the present age. The ever growing population demands increasing amount of food, clothing and shelter. Gradually, consciousness for nutritious food is growing among the people of all developed and developing nations of the world. It needs no emphasis that the aspired goals cannot be achieved unless the strategies of dynamism are applied in the existing structure of our economies. Though, more stress is laid on industrialisation - considered to be a key to economic growth, it is also true that the rural economies cannot be under-rated. Indeed, rural economies are complimentary to the urban and industrial economies. That is the reason why the world over, in general, and in India, in particular, the planning authorities at the very outset gave priority to agricultural and rural development during the First Plan period between 1952-1957. Much has been done in the direction of developing agriculture in many parts of India. Several organisations like F.A.O., Indian Council of Agricultural Research, the Planning Commission, National Council of Applied Economic Research and many other world and national organisations have done substantial researches and investigations. Yet, there are certain areas which have been unheeded by them. However, the Narmada Planning Group (Gandhinagar) has attempted to do many economic and industrial studies in certain areas coming under the Narmada Canal Command Zone. They have categorised these areas in zones 1 to 4. Some parts of the command area have been classed as "Problem Area" and put under Zone 4 A and 4 B.

The present study is confined to Zone 4 B, which has been the target of the furies of nature and considerable apathy of the planners.

It is, therefore, aimed to do an intensive study of the land use in the area at two points of time and find out the changes that have taken place in the land use as well as of the shortcomings of the present uses of the land, and give suggestions to correct the prevailing systems so that better advantages may be reaped from the inputs applied. It is also aimed to prove how a student of geography using the geographic techniques can help in changing the face of such problem regions.

In this process attempts will be made to test the following assumptions:

(1) Nature very much influences the land use patterns particularly that of agriculture, with its factor of rainfall.

(2) The land use, depends considerably on the decision making capability of man irrespective of natural conditions prevailing in the area.

(3) Institutional factors in many cases, keep the upper hand in modelling the patterns of land use.

(4) Institutional factors, however, fail to achieve the desired goals in land use due to the constraints posed by the natural environment.

(5) The land use model proposed by Von Thunen is not quite applicable to the study area.

## 1.6 A BRIEF REVIEW OF LITERATURE:

Research on general land use and cropland use are not new. Many a writers and research workers have worked on the various aspects of land use of the remote past, as far as they could collect the information from archeological and other sources.

The land-man relationship developed the very day man came on the earth. Much is not known about that period, but it may be conjectured that an organized primeval system of land use

might have started when man learnt the art of gathering food, fishing, hunting and ultimately domesticating animals, raising crops from the soil and then making shelters for habitation.

The old text books deal with the spatial distribution of settlements, agricultural crops, mono or multiple cropping patterns, the cattle and livestock raising etc. These aspects have been undergoing changes with the passage of time and with the man's increasing awareness of his environment.

Between the general and cropland use, the latter has attracted greater attention than the former. The changeable character of cropland use has been looked into by different workers from different angles. Chisholm (1889) saw it from economic and commercial view point. Other geographers of the nineteenth century attempted to understand the correlation between agriculture and physical as well as biotic factors, which proved a guideline for further researches in this field. Later geographers attempted to improve the old techniques and methods of researches in agricultural geography. The geographers of the early twentieth century introduced the regional and areal approaches in such studies. The West European geographers took the lead in this direction, and later it diffused to the U.S.A. and elsewhere. Physical and socio-economic studies in agriculture and livestock raising were introduced by them. Ratzel (1891) and Holms (1892) pioneered the studies in land use and cropland use from geographical view point. This required field survey and data collection for general land use and crop land use, soils and the related factors, and their depiction on large scale maps. (Dolge 1911, Sauer 1915).

Though comprehensive work on land use started during the early days of the modern period of geography, more progressive and systematic work started only after 1920s. Baker (1924) prepared the American Agricultural Atlas, and divided North America into Agricultural regions. Whittlesey (1936) produced the map of the World Agricultural Regions.

Between thirtees and early forties no noteworthy work was done, however, the task undertaken by Sir Dudley Stamp to survey every inch of the land of England and Scotland within two years from 1931-1933, was a landmark in land use surveys and research. He is believed to have systematized the methodology and studies on land use. His monumental publication - "Land of Britain ,Its use and Misuse", and its summarized version "The Land of Britain and How it is Used", stimulated land use studies not only in Britain but in various parts of the world. His efforts ultimately resulted into the organization of the World Land Use Survey under the aegis of which a number of researches were carried out the world over and several papers and monographs were published. Coppock (1964) explained the importance of physical and historical factors to reach to some results in the absence of data on socio-economic aspects in agricultural dynamism. Kostrowicki (1968) prepared a model for land use of Poland and saw the changes in land use combinations between the points of time. Coppock (1962, 1968, 1977), Clausan (1972), Champion (1974), Fraser Hart (1976), and Best (1981) laid greater emphasis on structural organizational, institutional and practical changes that have been taking place in their respective areas of study. Conkling and Yeates (1976) have seen the rural land use changes in the light of population growth, innovations and improvement in transportation, advances in production techniques, and increase in real income. They take recourse to agricultural location theories to find logical answers to the problems of location of agriculture. Champion (1981) looked at the dynamics of the land use through the loss of rural land to buildings, roads and related urban uses and also transfer of land to mining, afforestation and other activities. Wagner (1986) assessed the role of all weather roads causing change in general, and cropland uses in West African countries. Kohl Hepp (1986) discussed the agricultural problems of Latin America and suggested the strategies of change in the traditional methods, so as to meet the growing demand of food and nutrition. He suggested the measures for improving the production of cash crops for increase in exports. Many more works in land use and cropland use covering various aspects have been done by foreign scholars.

The trend of studies in agricultural regionalization present varied facets. The study on crop combination regions was initiated by Weaver (1954). With a cumbersome calculation he divided the Middle West of the U.S.A. into different crop combination regions and prepared the maps. He gave a new line in agricultural research which focussed on crop combinational analysis. Doi (1957) improved upon this method and made it easy in calculation by adding the table of critical values. Helburn (1957) introduced eleven criteria for the delineation of agricultural regions.

In India the work on land use synchronizes with the period of L.Dudley Stamp in England. Prof. S.C.Chatterjee of Calcutta worked on the landuse of 24 Pargana. Ali S.M. (1939) did his Ph.D. on the land use in Alaknanda river basin. However, since the early fiftees a tempo of this type of studies got accelerated when the Aligarh School took the lead in this direction. Piles of books and research articles were produced since then by the Indian geographers belonging to different universities and institutes of higher learning.

Shafi (1960) studied the land utilization in Eastern Uttar Pradesh and developed the soil crop relationship and identified changes in cropping pattern. Sinha (1963) identified the influence of climatic cycle on the agricultural rhythms in a canal irrigated area of Patna District and also noted the perception of the local people in this regard as expressed through local proverbs. In another paper (1965) he looked into the existing land use patterns in the same area as evolved with the introduction of canal irrigation.

More work in India has been done on various aspects of agricultural land use than on general land use. Ahmed (1966) studied the agricultural changes in the light of the crop yields while Singh (1966) analysed the changes in crop associations through the replacement of rice, maize, potato, etc. by indigo, millets and barley. Amani (1968) made a comparable study of Narainpur over a period of 40 years and noted the changes in the pattern of land use of that village as a consequence of the long processes

of interaction between the physical and socio-economics factors. Husain (1969) noted the variability of the succession of Kharif and Rabi crops in Meerut District, and studied the general use of land in both seasons. Dubey (1969) observed the changing pattern of cropland use in Madhya Pradesh owing to the increasing pressure of population. Ahmed (1969) studies the changing cropping pattern of Rohilkhand and established a high correlation between rainfall and cropland use. His hypothesis is applicable to all those areas where even today a high degree of environmental determinism is a haunting element; Saxena (1970) correlated the changing cropping patttern of a village in Badaun with climatic, edaphic and demographic factors; and Malhotra (1970) identified the changes in land use and cropping pattern brought about in Ganganagar by Rajasthan Canal (Now Indira Gandhi Canal). Sharma (1970) noted the replacement ofthe traditional crops by marketable crops in Assam. Singh (1972) studied the dynamics of land use and cropping pattern of Uttar Pradesh and identified the influence of economic factors. Das Gupta (1972) for Orissa and Shingarey (1972) for Maharashtra also worked on the same theme. Nand (1972) using the Doi's method divided Rajasthan into simple crop combination regions and noted the changes over time. Sharma (1983) applying Kostrowicki's method, identified the agriculture types and noted the changes in land use patterns in Rajasthan, through the influence of population pressure, industrial development, and also government policies. Ahmed and Khan (1984) studied the changes in crop combination and cropping pattern in Punjab plains between 1966-67 and 1976-77. They used Rafiullah's positive deviation method for the crop combination, and Gini's coefficient method for crop specialization. Rizvi and Bhatt (1984) identified the changes in the cropping pattern of village Rustampura in Gujarat on the basis of the return flow of the Mahi Canal waters which enhanced the prospects of irrigation in the village.

## 1.7 THE RESEARCH DESIGN:

The behaviour of the geographic space has been found changing at varying levels and degrees depending on the physical and socio-economic attributes of the area. The dynamics of land utilization is that phenomenon which accrues from the intervention of the physical and socio-economic factors in an area over time.

To measure the levels of temporal changes in the use of land and their variation in space in the study area and to identify the factors underlying them, the study has been designed in the following way:

(i) At the macro level (i.e. the area as a whole) the pattern of general and crop land use and the changes therein in a span of two decades have been studied.

(ii) At the meso level the area is divided into three sub-regions and the patterns of changes in each sub-region have been studied, and explained.

(iii) At the micro level the village is taken as the unit of study and the levels of dynamism have been identified, and the factors behind them explained.

In most cases the secondary data has been used. However, the primary information gathered from interrogating some of the experienced and knowledgeable farmers have proved valuable and referred to at proper places.

## 1.8 METHODOLOGY:

Having regard to the nature of the area, and the degree of availability of required data, a simple methodology has been employed for this work.

The general and cropland use data for the chosen points of time, 1959-60 and 1979-80, have been collecctd from the Mamlatdar, Taluka Development Officer (T.D.O.) and Talati (Patwari) offices at Jambusar and the respective villages (Talati offices).

To procure first hand information from the leading, experienced and knowledgeable farmers, a questionnaire based field work was conducted.

The percentage differences of the data of both general and cropland uses for the two points of time have been drawn, analysed and mapped. These differences have been taken as the

main gauge to measure the levels of change in each set of the land use of the area. The cropland use has been studied in greater depth and the levels of change have been seen from different angles. A few methods mentioned below have been used for the purpose:

(1) Crop combinational analysis based on J.C.Weaver's method has been adopted. Doi' method was also attempted, but his critical table is valid only upto 90 percent, whereas the area occupied by certain crops in the study area was 93 percent. Thus, Doi' method was given up.

(2) Weaver's method of total volume of change is also used. But in this case the crops occupying even 0.01 percent of the cropped land have been accounted for. This is done in view of the small size of the area.

In case of population, the data of 1959-60 and 1979-80 being not available the 1961 and 1981 census data have been used. An attempt has been made to assess the correlation between the population and net sown area; literacy and agricultural labourers. The Spearman rank correlation method is used for it.

The topographic maps of 1" to a mile and 1:50,000 are used to understand the physiographic and other changes. Though these maps are of different times, they give some idea of the changes having taken place during the study period.

The study of change is made at three levels. Macro the whole area, Meso - sub-regions, and Micro, the smallest unit - the village. The area, therefore, has been divided into three micro regions. Spils are taken as the region building element, as other natural elements bear almost the same characteristics through out the area. So these regions are in a sense mono-elemental regions. These regions are built for comparative study of dynamism, especially in the cropland use.

## 1.9 ORGANIZATION OF THE THESIS:

The study has been organized in seven chapters. Chapter-I introduces the problem in its various facets. It clarifies the definition and scope of the dynamics of land use, explains the

the objective of the study, gives the significance of such studies, and reviews the available literature on the main theme of the study. It concludes with outlining the methodology of the work and chapterization.

Chapter -II reveals the personality of the area in its physical, social and economic dimensions, to provide a background for further study in its proper perspective.

Chapter-III brings out the changes in the patterns of general land use. The entire general land use has been divided into two major parts (1) Land available for cultivation which includes the net sown area, the fallow land and the culturable wasteland, and (2) land not available for cultivation whichincludes as many as 14 categories viz., the grazing land, wasteland, kharland (saline land) and salt-pan, water bodies, forest, settlements, graveyards, cremation grounds, 'khali' (barn) 'ukardo' (garbage dumps) and 'jajroo' (place for easing). school and playground, temple, mosque, dargah (shrine) roads (PWD), farm roads and railway. Temporal and spatial changes in these types of land uses have been analysed.

Chapter-IV deals with the changes in cropland use in detail. It studies the areal patterns of change through two decades at three levels, total area, sub-regions, and units (villages). It also explains the total volume of change in cropping pattern. Chapter V deals with the crop ranking, crop combination and crop diversification.

Chapter-VI deals with the catalysts of change. A review of different factors, viz., physical, socio-cultural, economic, technological and institutional has been made in relation to the changes and attempt has been made to ascertain their degree of significance as a catalyst of change.

Chapter-VII includes the study with the summary, conclusions and recommendations.

Bibliography, glossary of local terms and appendices are given at the end.