CHAPTER-I
INTRODUCTION

1.1 General Introduction

Agriculture is one of the world’s most important activities supporting human life. Until 10,000 years ago, hunting, fishing, and gathering seeds, fruits, roots and shellfish provided the food for the small number of people in the world, possibly about five million (Cohen, 1995). Population increase and advancement in the civilization made man to settle at one place and to cultivate the same area year after year. Now agriculture became a profession is given the name commercial agriculture and precision agriculture and sustainable as being the part of it. Nowadays, the population of the planet is growing dramatically. In order to meet the increasing need for the food farming community has to produce more and more. Under present situation, where the land is a limiting factor, it is impossible to bring more area under cultivation (extensive farming), so farming community has to tackle this challenge for producing more and more food with the available land only (intensive farming). Higher productivity, profitability and health of mankind as well as environment are the concerns of the present agriculture. Hence much attention is paid on selection of a crop, which suits an area, the best.

Agriculture is one of the most important economic sectors in Iran. It contributes twenty percent (one-fifth) of total national income (GDP), 23.4 percent of total employment, 80 per cent of domestic food requirements and more than one-third of non-oil exports. Agriculture is also major
occupation employing 70 percent of total population in rural areas, and is still continue as main source of livelihood of human being inspite of growing industrialization and urbanization. Agriculture is the outcome of the combination of both physical and socio-economic factors. The total population of the country was about 62.8 million in 1999, with annual growth rate of 1.7 per cent. The total manpower in agriculture sector was about 3.5 million, the share of agriculture in the total employment was 23.4 per cent all in 1999. Iran’s land surface covers 165 million hectares. In general, Iran is a mountainous and semi-arid country and about half of this area is covered by hills and mountains, an one-forth by infertile deserts. Thus, only about one-forth of the country’s total area is arable. In general about 51 million hectares or almost 31 percent of the total land area promises satisfactory potentials for agricultural uses. However 33 million hectares of 62 percent of arable land have not been brought under cultivation as yet. From 18.8 million hectares currently allocated to agricultural production merely 50-60 percent are utilized annually, as extensive lands are set aside to fallow. As a result, farming activity shows a very patchy distribution within the framework of the country as a whole. Only Caspian lowlands, has unbroken mosaic of agricultural land. (A. Moemeni, 2002). The significance of agriculture is therefore indeed unique and wide-ranging. Iran has always pursued food security, i.e. providing adequate and safe food for all, as a major priority. In this respect, the Third Five Year Development Plan places a very high priority on the improvement of food security through enhancing domestic
production. Even then, the process of agricultural growth has not been properly channelized due to imbalance allocation of resources, unavailability of basic infrastructure and uneven rainfall. There is a need to improve the pattern by which food is supplied. Agricultural sector in Iran is responsible to provide raw materials for processing and complementary industry. The trend of agricultural production shows a growth in the last three decades. At present, 90 percent of the needs of industrial units to agricultural row products are supplied domestically. Iran ranks first to tenth in the production of 15 out of 25 major horticultural crops in the world; in terms of orchards diversity, the nation holds third place after China, United States and Turkey. The status of Iran in field crops production is not as high as horticultural crops, but it is still relatively suitable compared to many other countries. By and large, Iran ranks eighth terms of the aggregate diversity of field and horticultural crops in the world. 12.3 mha out of 164.5 mha total land area of Iran are under crops (2000). The present investigation has an attempt to study the agriculture landuse and planning of Jiroft Watershed in Kerman Province (Central southeast). The region has not been so far studied from agriculture point of view. This treatise further makes an indepth study of both general and agricultural landuse at village level for Jiroft Watershed and identifies related problems for better landuse study and to prepare judicious planning.
1.2 Choice of the Region

The choice of the study area and topic for investigation is considered due to the following reasons: Firstly, Jiroft watershed is one of the most important and productivity agricultural area of Iran. It has significant location in south central of the country; this area is known as small India of Iran because of variety of physical conditions and crop production. No systematic investigation on land suitability and land use planning has been carried out in the study area so far. Secondly, the agricultural land use study of the region remains still untouched throughout the Watershed for planning and development. Hence the current land use and lacking a firm sustainable basis of the study area has been chosen to identify the potential and limitations of agricultural conditions of this region. The study of under investigation is at rural district level. The appropriate agricultural land use of the region under study calls for proper planning to exploit the potential of the region, particularly in the contents the recent improvement and modernization of agricultural sector. Thirdly, selection of region calls for such an analytical study as it is economically backward and its basic resources reveal considerable potential. The related and relative infrastructure can yield impressive results. The approach followed in this research assumed that development would be planned within a local framework that ensures complementary development of area under study of Iran. And also this research can be used by government and non-government agencies in national level to
guide and encourage them in the preparation of their strategies for agricultural development planning.

1.3 Area Under Study

Jiroft watershed is situated in south central part in Kerman province covering 13,244.2 square kilometers area and has 217,608 population (1996 Census). Administratively, this watershed has divided into 21 rural districts and it is consisting of 1236 revenue villages and two urban settlements (Fig.1.1). Population density of Jiroft watershed is 16.4 persons per square kilometer (1996 Census). The study region extends from 28° 5' 9" to 29° 21' 30" north latitudes and 56° 44'32 to 58° 31'5’ east longitudes. It has a length of about 150 kilometers from west to east and 105 kilometers from north to south. The region falls under scarcity rainfall zone and experiences typically mediterranean climate. Seventy two percent of rainfall receives in winter (from December to April). The summer is hot and has dryness it receives one per cent of total rainfall. Rainfall ranges from 157mm in central and south parts and more than 350 mm in the north parts in study region. Mediterranean cyclone generally commences in December and receives highest rainfall in January (79.3 mm) and lowest in July (less than 1 mm). The highest temperature is observed in July (43.8° centigrade in lowland area) and lowest in January in Jiroft watershed. Jiroft watershed by applying Digital Elevation Model (DEM) has been divided into four physiographical zones, namely, highland, moderate highland; piedmont and alluvial fans and alluvial plain.
Fig. No. 1.1 – Location Map
and land use/land cover patterns. The highland consists of mountainous and hilly area. Cliffs in the highland zone on all sides of the watershed are very steep (>30 percent) towards central and south. Geological formation of Jiroft watershed is complex in both stratigraphically and structurally. The rocks range in age probably from Paleozoic to recent time (Holocene). There are five major soil types, namely, lithosols, calcareous and sierozem soils in moderate elevation zone, coarse textured colluvial and regosols soils in piedmont and alluvial fans, fine textured alluvial soil and solonchak and solonetz in Jiroft plain in central and south-central parts occupying 42.5 percent, 30.2 percent, 22.5 percent, 2.3 percent and 2.5 percent respectively. The Lithosols soil has confined to north east and southeast parts, calcareous and sierozem soils lying in west part, coarse textured colluvial and regosols soil lie in central part in Jiroft plain and in Esfandagheh plain in west part, which play a vital role in feeding of groundwater in study region, fine textured Alluvial soils laying in central part and solonchak and solonetz has spreaded in southcentral part in Jiroft watershed. The data regarding general and agricultural landuse were collected for ten years (1993-94 to 2002-03). The general landuse consist of five categories namely, net sown area, forest cover, pasture, fallow land, and land not available for cultivation. Different landuse categories have different fluctuation some of them have increased in study period (Net sown area, land not available for cultivation) and areas of others have decreased (Pasture, forest, fallow land). Total net sown area was 82628 hectares in 2002-03. Orange, date, wheat, potato, and
cucumber, are major crops in Jiroft watershed. Irrigation is only the way for rising crop production per unit area. Halili Rud, deep wells, ducts (Ghnat) and springs are the main sources of water in the study region. Extensive cropping pattern is possible in Jiroft plain throughout the year because of green house production systems, assured irrigation facilities and due to well distributed of ground water availability during crop season.

1.4 Objectives of the Study

This thesis has been undertaken to make an indepth and comprehensive study of agriculture landuse, its planning and development in Jiroft Watershed, Iran by examining following objectives:

(i) Assessing the physical background.
(ii) Studying the general and agricultural landuse.
(iii) Identifying crop combination and crop diversification region.
(iv) Establishing the relationship between landuse and environmental variables.
(v) Suggesting remedial measures for better agriculture land use for Jiroft Watershed.

1.5 Data Sources and Methodology

The present study was based on primary and secondary sources. The published sources, namely, Iranian Statistical Center, Population and Housing Census Center, Ministry of Jahad-e-Agriculture, Soil and Water Research Institute, Agricultural Services Centers of Jiroft watershed, Iranian Meteorological Organization, Agricultural Jahad-e-Organization of Jiroft watershed, National Gazetteer of Kerman province, Iranian Remote Sensing Center, Iranian Surveying Organization, Iranian Geographical
Organization, General Office of Natural Resources of Kerman province, Department of Irrigation, Ground water Survey and Development of Jiroft city. The data for 15 crops for 21 rural districts from 1993-94 to 2002-03 have used in temporal landuse study in study region. Crops data for spatial landuse pattern is related to 2002-03. The biophysical parameters were obtained from different maps or digital database containing information on soil condition, relief, vegetation, climate and personal fieldwork. The collected data could be implemented in Geographical Information System (GIS) and related technologies (e.g., remote sensing, global position system) have proven to be a valuable tool in land use planning activities. GIS Technique, Remote sensing data and aerial photographs have been used for mapping of Digital Elevation Model, slope, drainage, geology, landuse/land cover maps. Global Position System (GPS) is applied in intensive filed work of sample villages. For delineating crop regions, crop ranking, crop combination and crop diversification methods have been employed in present study. Rafiullah’s crop combination technique was applied to compute crop combination regions and Gibb’s Martins Index was applied to show diversification of crops. Further landuse pattern was studied for selected variables by applying correlation coefficient, multiple regression and Factor Analysis techniques. Twenty-three variables are carefully selected to assess the relationship for correlation coefficient in study area. Lastly problems of landuse have been identified and suggestions were given for better planning and development of agriculture landuse in Jiroft watershed.
Primary data have obtained of these six sample villages have collected personally through questionnaires. The questionnaires cover aspects like crop landuse, farmers’ education, income from various sources and problems regarding agriculture and allied sectors. The spatial and temporal aspects of general and agricultural landuse were studied indepthly for selected sample villages. The village level data regarding landuse and agricultural landuse were converted into percentage and have shown in maps of concerned villages. Suitable diagrams and graphs have depicted for showing landuse pattern. Further, the data obtained regarding six sample villages was used to delineate the crop productivity for entire Jiroft watershed.

1.6 Arrangement of the Text

The proposed study has been arranged into eleven chapters. The opening chapter put fourths objectives of study, database and methodology, arrangement of text, limitations and problems of study area. The chapter second has attempted to present the review of literature and researches on landuse and land-cover patterns. The third chapter has tried to present the physical setting in Jiroft watershed with respect to location, physiography, climate, drainage, geology, soil, and natural vegetation. Fourth chapter is related to socio-economic profile i.e. population and occupational structure, transportation linkages, market centers, land holding and irrigation. The chapter fifth has unfolded the spatio-temporal analysis of general landuse study, volume of change from 1993-1994 to 2002-2003 for the net sown area, land not available for
cultivation, fallow land, pasture and forest covers in Jiroft watershed. The chapter sixth has investigated the agricultural landuse pattern of fifteen selected crops with spatio-temporal variations in study area. Here spatial study of land of jiroft watershed was carried out for 2002-2003. The chapter seventh has studied crop regions by applying techniques like crop ranking, crop combination and crop diversification. The chapter eight has studied the crop productivity of Jiroft watershed by applied Enedi’s methods by collecting yield data by purposive samples. The chapter ninth has computed the relationship between selected landuse and environmental variables. This chapter has further studied by applying correlation coefficient, multiple regression and Factor Analysis. The chapter tenth of this thesis epitomized the intensive and detailed study of general landuse and agricultural landuse of six selected sample villages, namely, Dosari, Dask, SadAbad, MohammadAbad-e-Roozpir, Ferdows, and Aliabad-e-ghadiri, by the purposive random sampling technique. The chapter eleven summarizes the summary and findings. The suggestions for better planning and development were further made for Jiroft watershed.

1.7 Limitations and Problems

Data and information play a key role in effective performance of land use planning. The present study converges upon available data. Thus investigator has interfaced with some limitations for compilation of this study. Data regarding general as well as agricultural landuse was available for rural districts level for ten years from 1993-2002. There are
only two meteorological stations entire the study region, which synoptic climatically data was available for 12 years. In case of crop-landuse the data for 21 rural districts were not available hence, our study has made only for year 2002-2003 for showing spatial distribution. The yield data for all crops to 21 districts were not available hence; attempt has made to collect primary data of yield of certain villages’ interviews during fieldwork for sample villages. Thus five leading crops considered for measuring of agricultural productivity for Jiroft watershed as whole.