

MINOR RESEARCH PROJECT
ON
CROP LANDUSE CHANGES AND
IDENTIFICATION OF DETERMINANTS:
A CASE STUDY OF PUNE DISTRICT

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Abstract

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Landuse and land cover change is for the human modification of earth's terrestrial surface. The human being has modifying land to obtain food and other essentials from thousands of years. Landuse and Landcover changes are far greater than ever in history deriving unprecedented changes in ecosystem and environmental processes at local, regional and global levels. These changes encompass the environmental concerns of human population, climate change, biodiversity loss and the water pollution soils and air. Monitoring and mediating the negative consequences of landuse and land cover changes for sustaining the production of essential resources and therefore, this becomes major priority of researchers and policy makers in world.

Agriculture continues to sustain millions of people in India. This is despite the rapid industrialization which is acquiring significant proportions in many regions of the country. Agriculture is one of the oldest economic activities of man. In India 63 percent population lives in rural area and it contributes nearly 17.20 percent of gross domestic product. Over 63 percent population depends on agriculture for their livelihood (Datta and Sundharam, 2006). Distribution of agriculture depends upon large number of geo-hydrological, environmental, biological and socio-economic variables. In India 60 percent area is rainfed. Agricultural landscape has drastically changed in the last two decades. Better agriculture techniques have successfully applied in order to achieve self sufficiency in agriculture production. The five year plans are aimed to make India self reliant in agriculture sector. Hence for the last five plans, many programmes such as community development programme, extension services, expansion of irrigation facilities, fertilizers, agricultural machineries, high yielding varieties of seeds, expansion of transport, power, marketing and institutional credit have introduced. Before green revolution Indian agriculture was facing many problems such as lack of irrigation, limited use of technology, unsuccessful land reforms, explosive population growth, decreasing investment in agriculture sector etc. Green revolution has changed the face of agriculture in India. The expansion of farming areas, double cropping of existing farm lands, using High Yielding Varieties of seeds are the three basic elements of green revolution. During the five year plans more emphasis was given to bring more and more area under agriculture and

increasing per hectare yield. Even then the process of agricultural growth has not been properly channelized due to imbalanced distribution of resources, infrastructure, physical and socio-economic conditions in different regions. The present study is a modest attempt to assess the spatio-temporal variation in landuse pattern in Pune district.

The regional survey of landuse was carried out Late L. D. Stamp in Britain in 1930 by. This was perhaps first exercise to survey the land which was, later on, adopted by many geographers, economists and planners. Dr. S. P. Chatterjee (1940) stresses the needs of landuse survey and he carried out the study on land utilization Shafi Mohamand (1960), Mohammed Ali (1967), Ganguli (1964), Karimi (1950) and Lahiri (1950) have concentrated on landuse survey. Later, World Landuse Survey was brought forward by S. Van Volkenberge, Clark University, Massachussettes in 1949. K. Das (1970) has concentrated study of landuse in Kosi basin in North Bihar. L.S. Bhat (1972) has stressed the necessity of the concept of planning at village, block and district level. The notable work on landuse studies in this regards are made by C. T. Pawar (1978), Odilla Coutinho (1980), K. S. More (1980), P. R. Karmarkar (1981), V. S. Datye (1984), S. D. Shinde (1989), and B. C. Vaidya (1997). The measurement of crop productivity was assessed by Varsha Vaid (1989) and Arun Patil (2002).

Pune district is selected for present study. The choice and topic under investigation is influenced by many considerations. Firstly, study region falls in changing cropping pattern two separate geographical regions having diversified in rainfall at relief characteristics. Secondly, this region has not been so far studied thoroughly from landuse point of view by geographers and therefore study region has remains still untouched for landuse study. Thirdly, irrigation is influencing factor in study region. Presently, it has considerable impact on changing cropping pattern. Fourthly, nearness to Pune metropolitan within study region has attracted researcher to undertake this study.

Pune district is extended from 17° 54' and 10° 24' north latitudes and 73° 19' and 75° 10' east longitudes covering 15,642 square kilometers area and population of 94,26,959 in 2011 censuses. This region is bounded by Ahmednagar district on northeast, Solapur district on southeast, Satara district on south, Raigad district on west and Thane district on northwest. It is the second largest district in Maharashtra state accounting 5.10 percent area. The landscape of Pune district is triangular in shape. Administratively, this district is divided into fourteen talukas, namely, Junnar,

Ambegaon, Khed, Maval, Mulshi, Velhe, Bhor, Haveli, Purandar, Pune city, Indapur, Daund, Baramati and Shirur. Pune is the administrative headquarter of study region. The slope is towards southeast. In west, there is Sahyadri basaltic mountain running north to south. Average rainfall is 600 mm during July to October. The summer begins from early March to June experiencing dry and hot climate. The temperature ranges from 20° to 38°C. From November to January temperature lower from 9°C to 14°C. January to March appears moderate temperature. The study region has 60 percent net sown area. Total irrigation in study area is 27 percent. There are 26.9 percent cultivators and 12.7 percent agricultural labourers in study region. The main crops in study region are jowar, rice, bajara, wheat, sugarcane, groundnut, gram, safflower, crops and many vegetables crops fields. The per capital land holding of farmers is 1.54 hectares. Kharif, rabi and summer seasons are observed in study region.

The present research has been undertaken to make on in-depth and comprehensive study of agriculture landuse in Pune district by evaluating following objectives:

- i) Examining the physical background of study region.
- ii) Studying general and agricultural landuse pattern.
- iii) Identifying agricultural determinants of the study region.
- iv) Identifying crop combination and diversification regions in study region.
- v) Establishing relationship between selected variables and delineate the agricultural regions.
- vi) Suggesting remedial measures for better landuse agriculture in Pune district.

The present study was based on primary and secondary sources. The published sources, namely, Taluka Revenue Record, Socio-economic Abstract of Pune District., District Census Handbook, Department of Irrigation, Ground Water Survey and Development Agency, Taluka Land Record Office have used in present study. Primary data have obtained for three sample villages through questionnaires. The data for general landuse and agricultural landuse have been taken for the years 1980-81, 1985-86, 1990-91, 1995-96, 2000-01 and 2005-06. The population data have taken for census year of 1981, 1991 and 2001. The questions in questionnaires are consists of crop landuse, farmers' education, income from various sources and problems regarding agriculture and allied sectors. Besides this information from Talathi,

Gramsevak and Sarpanch were gathered. The village level landuse data have collected for the year 2008-09 and 2009-10. The obtained data is then mapped by using suitable method as diagrams and graphs for showing landuse pattern. For delineating crop region, Doi's crop combination technique was applied to identify the crop combination regions and Gibbs-Martin Index was applied for diversification region. Further, the relationship between selected variables was used correlation coefficient, multiple regression and Factor Analysis techniques.

The opening chapter put forth objectives of study, data sources, methodology of the study. The second chapter has highlighted on literature review of the research topic. The chapter third has attempted to present the background of study area with respect to location, physiography, climate, geology, soil, natural vegetation, transportation, and socio-economic profile of the population. The chapter fourth has unfolded the spatial and temporal analysis of general landuse study, volume of change from 1980 to 2005 for the net sown area, land not available for cultivation, cultivable waste, fallow land and forest cover and agricultural landuse of ten selected crops both spatial and temporal variations in study region. The chapter fifth has identified agricultural determinants. The chapter sixth has studied crop region by applying techniques like crop ranking, crop combination, crop diversification and Factor Analysis. The seventh chapter has studied the case studies three sample villages. The chapter eighth has summarized the results. This last summarizes the summary of chapters and findings have been given. The suggestions of better landuse study have putforth in present study.

In Haveli, Maval and Baramati talukas the agricultural land is being converted into non-agricultural land. This process is hampering the growth crops and production too. Government should be restricted this conversion by byelaws. The dryland agriculture in central and east parts in study region in Indapur, Baramati, Purandar, Daund and Shirur talukas, evaporation losses can be reduced by mulches, anti-transpirants, wind breaks and weed control. Most of the part of Maval, Ambegaon, Mulshi, Bhor and Velha talukas are still rain-fed. In these talukas planners must give attention on the development of non-arable land and irrigation facilities. Agro-forestry, pasture development, horticulture and alternate landuse in these areas will help to reduce the problems of rain-fed area.

The village survey is carried out in three sample villages, namely, Nimbut, Padali and Naigaon in study region in three different zones. The farmers of these

villages are worried about the uneven rainfall. Due to uncertainty of uneven rainfall and failure of crop production, it has revealed during the field visits that farmers were reluctant about crop insurance in Purandar, Bhor, Maval and Ambegaon talukas. In these areas farmers must adopt crop insurance scheme. This will provide insurance coverage and financial support to farmers in the event of failure of any of the notified crop as a result of natural calamities, pests and diseases. Baramati, Daund and Indapur talukas have salinity problem due to excessive canal irrigation to sugarcane. Measures should be applied to reduce salinity of soil by proper water management and selecting alternative suitable crops. Application of farm yard manure at 5 ton per hectare at 10-15 days before transplanting or ploughing the crops can be the alleviate the problems of salinity. The central and east part in study region, watershed management is highly requires particularly in Shirur, Purandar, Haveli, Junnar, Maval, Khed and Mulshi talukas. This will increase the underground water table where canal irrigation is not possible. Farmers have to construct the field pond in their farms for irrigation purpose and attempt to recharge the underground water in wells and tube-wells. Farmers in these areas should recharge their wells through rainwater harvesting and watershed development. Low productivity of agriculture is observed in Maval, Velha, Ambegaon and Bhor talukas due to use of traditional seeds by farmers, so it is very essential to use high yielding variety of seeds. The Seed Testing Laboratory at each taluka is essential for testing the quality of seeds sown by farmers.

Farmers should form their association on needs basis to determine the price for their own produce. Minimum support price of fruits and vegetables must be decided by the government for wheat, rice and jowar. To minimize the damage caused by the insects, efficient application of integrated pest and insect management programme is essential in this area. Farmers also should have to take plant quarantine facilities to prevent the introduction of any insect, fungus or other pest, which may be destructive to crops. Government should establish Plant Quarantine Stations at every taluka level to facilitate every farmer. Traditional methods of irrigation are responsible for the wastage of water and causing problems by over irrigation in Daund and Baramati talukas. Therefore, farmers in this area should be guided and trained for the advanced method of irrigation such as drip, sprinkler etc. which saves water and decreases threat of salinization. Purandar, Shirur, Haveli and Junnar talukas have water scarcity during summer season. It is suggested that, farmers in these talukas should use drip irrigation. Overdoses of chemical fertilizers are responsible for soil degradation in

Baramati, Daund and Indapur talukas. The use of organic agriculture and fertilizer management programme is one of prime requirement in study region. Godowns and storage houses should be created to store vegetables such as onion and tomatoes at Junnar, Baramati and Haveli talukas. Fruits storage facility be provided in Purandar, Baramati, Indapur and Shirur talukas.

The study region belongs to western part in Maharashtra state where rainfall varies between 500 to 600 millimeters. The study region has varied topography, soil and climate. Land in river valleys is fertile which resulted to cultivate sugarcane and fruits and vegetables besides jowar and bajra. Agriculture department and farmers in Pune district are making efforts to improve agricultural practice to cultivate maximum area under crop. New planning strategies needs to be introduced to enhance the knowledge of farmers and for increased yield. These typical characteristics of this region can be same background for immense development of agriculture sector. Such study may attention of experts from various fields like planning, agriculture, economics and administrators for further study for better agricultural landuse in Pune district.