

A Spatio-temporal Analysis of Agricultural Cropping Pattern of Baramati Tahsil, Pune District (Maharashtra).

Dr. Sunil B. Ogale

Assistant Professor Department of Geography, Vidya Pratishthan's A.S.C. College Baramati, Pune District Maharashtra State, India.

***Corresponding Author:**

Dr. Sunil B. Ogale

Email: sunilogale@gmail.com

Abstract: Agricultural land use means the extent of the gross cropped area during the agricultural year under various crops. It is the result of the decision made by the farmers regarding the choice of crops and methods for production. Baramati tahsil is situated in east part in Pune district covering 1382 square kilometer area and having 429690 populations (2011). This taluka consists of 117 revenue villages with one urban settlement. Administratively, this taluka has divided into six revenue circles. Population density of taluka is 311 persons per square kilometer (2011). The study region extends from 18° 2' 44'' N to 18° 23' 19'' North latitudes and 74° 13' 8'' E to 74° 42' 47'' East longitudes. The region falls under scarcity zone having rainfall between 400 to 500 mm. Monsoon generally commences in June, occurring highest rainfall in June (158 mm) and lowest in December (12 mm). The highest mean temperature is observed in May (34.6⁰ centigrade) and lowest in January (18.5⁰ centigrade). The slope of region is towards northwest and southeast. The study area has basaltic base having step like topography. Baramati tahsil is somewhat rectangular in shape. The study region is mainly agrarian having 84.89 percent net sown area of the total geographical area. The present study focuses on spatial distribution of agricultural crops in the Baramati tahsil. The spatial distribution and their temporal variations have been studied for the period from 1991-2011. The data regarding crops have collected for 117 villages from concerned talukas from talathi, sarpanch and tahsil office. The collected data was then converted into percentage to net sown area. Later on, these crops percentages were arranged into different groups and finally spatial distribution was studied for nine crops in the study area. Such type of study represents real situation of cropping pattern of Baramati Tahsil, Pune District and helps to planners, agricultural scientists and research scholars.

Keywords: Landuse pattern, cropping pattern, Agricultural landuse, Spatio-temporal variation.

INTRODUCTION

Agriculture is the basic occupation of human beings which provides food and other needs. There is rapid growth of industry and service sector in modern India. But agriculture is still an important economic activity. The rural economy is still based on agriculture. But the process of agricultural growth has not been studied properly in most of the rural areas.

There are some previous literature available showing Spatial Analysis of Agricultural crops, lands, and efficacy.

Rahane BB studied agricultural pattern and its spatial variation Thane is one of the districts in North Konkan situated to the north of Mumbai [1].

Bhatia SS studied Spatial Variation, Changes and Trends in Agricultural Efficiency in Uttar Pradesh during 1953-1963 [2].

Bhatia, C.S. studied Changing Landuse and Cropping Pattern in Bihar during 1980s [3]. B. K. Roy has conducted landuse study of five villages of Ballia district and examined the physical conditions, occupational structure responsible for better landuse pattern [4]. Das MM studied Agricultural Land use and Cropping Pattern in Assam [5].

Therefore the present treatise is a modest attempt to study a spatio-temporal analysis of agricultural land use of Baramati Tahsil in Pune district. The present study is an attempt to explore the issues of the imbalance allocation of resources basic infrastructure, uneven rainfall and its effect on the agriculture product.

Study Area

Baramati tahsil lies between 18° 2' 44'' N to 18° 23' 19'' North latitudes and 74° 13' 8'' E to 74° 42' 47'' East longitudes. It is located at an altitude of 538 meters above mean sea level. The tahsil lies in the

eastern part of Pune district of Maharashtra. The river Nira flows west to east forming the southern boundary of the Tahsil and the district. The river Karha flows northwest to south-east Baramati tahsil is bounded by Indapur tahsil towards the east, Satara district towards the south, Purandar tahsil towards the west and Daund Tahsil towards the north. The total geographical area (TGA) of Baramati tahsil is 1382 sq. km., which is about 8.80 percent of TGA of the Pune district (See Fig.1).

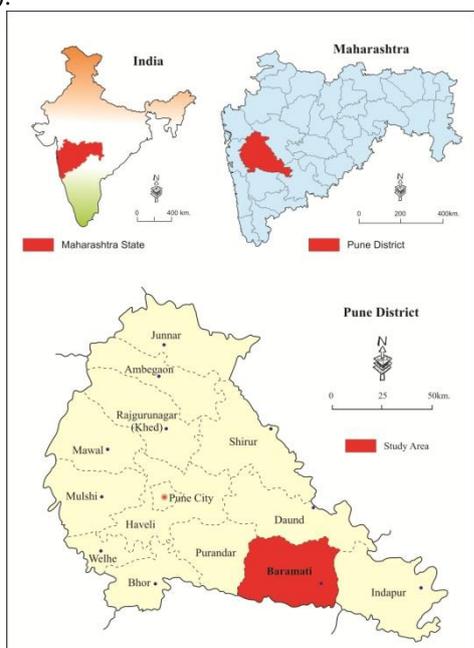


Fig.1 Location Map of the Study Area

Objectives

- i) Examining the physical background.
- ii) Study a spatio-temporal analysis of agricultural cropping pattern of the Baramati Tahsil.

Data Sources

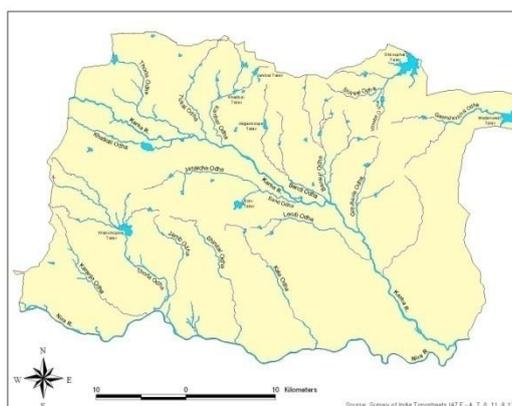
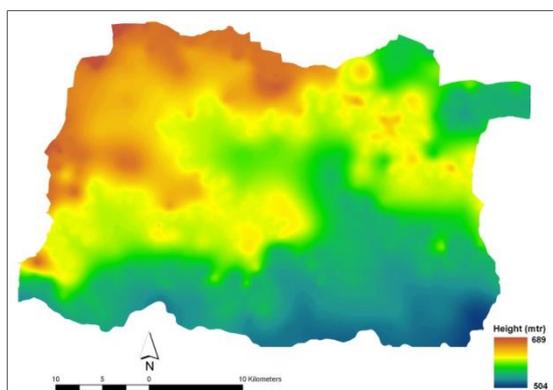


Fig. 2 Physiography and Drainage Map of the Baramati Tahsil

Soil Types:-

The fertility of soil is one of the factors affecting land capability of agricultural development.

The present study is based on primary and secondary sources. Survey of India (SOI) Topographical sheet No. 47J/12, 47J/13, 47J/15 and 47J/11 on 1:50000 Scale. Guide Map of Baramati tahsil Socio-economic Abstract-2011. Soil map has been prepared by National Bureau of Soil Survey and Landuse Planning Pune and Agricultural Development Trust (KVK) Baramati Tahsil. The spatial distribution and their temporal variations has been studied for the period from 1991-2011. The data regarding crops have collected for 117 villages from concerned talukas from talathi, sarpanch and revenue office of the Baramati tahsil. Spatial distribution of nine crops has studied only for one time point i.e. 2010-2011.

Physiography and Drainage

Baramati tahsil may be divided into two physiographic regions according to altitude. The first one is the hilly track above the 650 meters altitude observed at northwest corner of the tahsil. The other one is gently sloping belt along Nira and its tributary Karha. There are two water divides; one divides the Nira and the Karha basin while the other runs from west to east between Karha and Bhima. The second belt of hilly region runs from northwest to southwest corner of the tahsil. This is the highest point in the region (650 m) and lies at the junction of the three tahsils of the Pune district viz. Daund, Purandar and Baramati. The hilly zone locally called as *Malran* (open, non cultivated land) shows that agriculture is poor. The riverine belts along Nira and Karha occupy 40 percent area of the tahsil. This region offers favourable situation for irrigation and hence agro-based development. Topographically, it is almost a plain region with alluvial soils. The generalised direction of slope is from northwest to southeast in the Karha basin and from west to east in the Nira. Baramati tahsil is mainly drained by river Nira and its main tributary Karha. Nira is an important tributary of river Bhima. It is a natural boundary between Pune and Satara District (See Fig. 2).

There are three types of soil found in the study area, namely, coarse shallow plateau soil, medium deep soil and deep black soil. Coarse shallow soil is observed in

the hilly region. The medium black soil appeared in the surrounding area of Nira river and its tributary Karha. This soil is suitable for cultivation of sugarcane, wheat, oilseeds and pulses. The deep black soil lies along the bank of Nira river occupying 20 percent of the study region. This soil is rich in moisture and has high retentive capacity (See Fig. 3 Soil Type of the Baramati Tahsil)

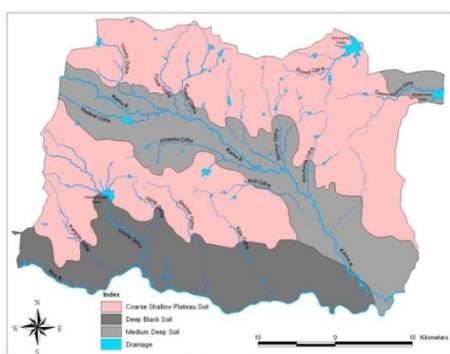


Fig.3 Soil Type of the study area

Temporal Variations in Agricultural Cropping Pattern:-

The cropping pattern in any region cannot remain static due to the variations in the rainfall amount and nature of inputs and environmental instability. Moreover, introduction of new high yielding varieties of seeds, irrigation facilities and technical knowledge are responsible for temporal changes. The factors for such changes in cropping patterns differ from village to village and region to region. Therefore, it is worthwhile to study isolated causes of changes occurring through space and time. Table-1 and Fig. 4 display temporal variations of nine crops in study region from 1990-91 to 2010-11. The cropping pattern undergoes changes in response to the changing physical and cultural environment (See Table-1 and Fig.4).

Table-1: Temporal Variations in Agricultural Cropping Pattern

Sr. No.	Name of the Crops	1990-91		2000-01		2010-11	
		Area (Hectares)	Percent to NSA	Area (Hectares)	Percent to NSA	Area (Hectares)	Percent to NSA
1	Jowar	29015	30.35	25669	24.66	23359	22.44
2	Wheat	12581	13.16	16215	15.58	16404	15.76
3	Bajara	21342	22.32	19440	18.67	19984	19.2
4	Sugarcane	13570	14.19	21397	20.55	22127	21.25
5	Fodder Crops	12580	13.16	12891	12.38	13229	12.71
6	Oilseeds	3788	3.96	2851	2.74	2964	2.85
7	Pulses	4090	4.28	3325	3.19	3209	3.08
8	Fruits	984	1.03	1695	1.63	2062	1.98
9	Vegetables	766	0.8	913	0.88	1067	1.02

Source: Revenue Record, Talathi Office, Baramati

The total area under jowar in 1990-91 was 30.35 percent of the total cropped area. In 2010-11 jowar accounted for 22.44 percent. The trend of jowar crop during the study period has been steadily declined. The maximum hectareage of jowar is declined in 2010-11 by 7.91 percent. Because in the north and central parts, the sugarcane cultivation has been increased. Wheat occupies 15.76 percent net sown area in study region and it is increased by 2.36 percent in 2010-11. The

sugarcane has shown a steadily increasing trend during the study period. The total increase in sugarcane is 7.06 percent. There is a significant variation in the volume of change in sugarcane. Sugarcane, wheat, fruits and vegetable crops have shown increasing trend during the study period. Increasing irrigation facility is the main cause of this variation. Bajara, fodder crops, oilseeds and pulses are slightly decreasing in Baramati Tahsil (See Fig. 4).

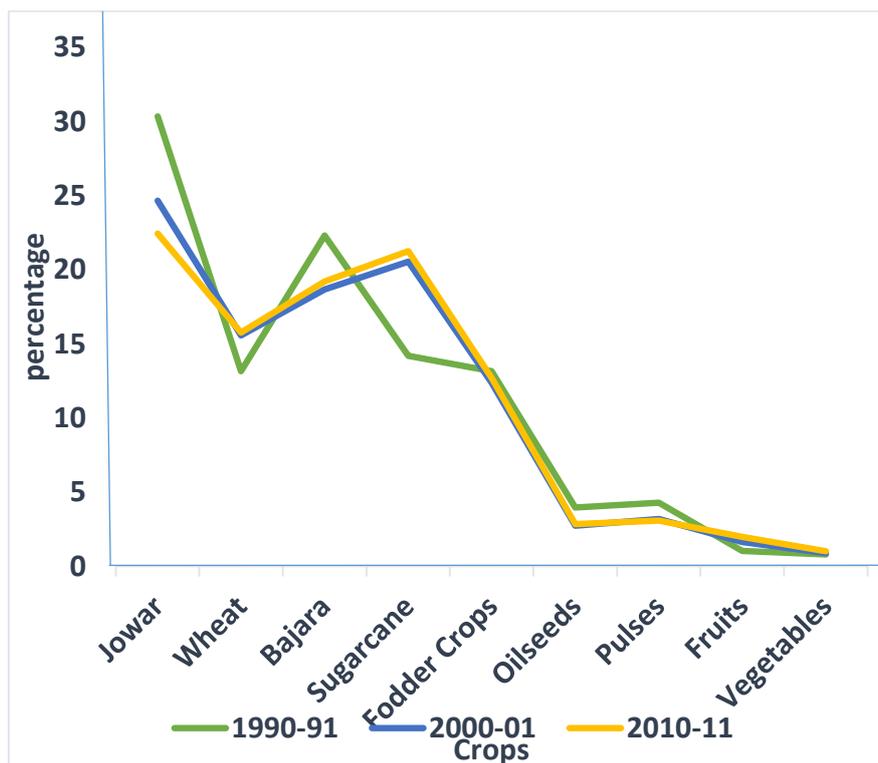


Fig.4: Temporal Variations of the Baramati Tahsil (1990-91 to 2010-11)

Spatial Distribution of Agricultural Cropping Pattern:-

This study has attempted to assess the spatial distribution of agricultural crops in study area. Jowar,

wheat, sugarcane, fodder crops, pulses, fruits, vegetables and other crops are mainly grown in study region on different soil types, amount of rainfall, irrigation and farmers decision (See Table-2).

Table-2: Agricultural Cropping Pattern of the Baramati Tahsil (2010-11)

Sr. No.	Crops	Area (Hectares)	Percent to NSA
1	Jowar	23359	22.44
2	Wheat	16404	15.76
3	Bajara	19984	19.2
4	Sugarcane	22127	21.25
5	Fodder Crops	13229	12.71
6	Oilseeds	2964	2.85
7	Pulses	3209	3.08
8	Fruits	2062	1.98
9	Vegetables	1067	1.02

Source: Revenue Record, Baramati Tahsil.

- Jowar is identified as first ranking crop occupying 22.44 percent of net sown area. This crop is mainly concentrated in the north and central part due to lack of irrigation facilities and undulating topography. The jowar crop is completely dependent on the monsoon. Less than 20 percent net sown area under jowar is identified in 53 villages which are located southern part of the study area.
- Wheat occupies fourth position in the crop pattern after jowar, sugarcane and bajara. Maximum identified wheat under cultivation net sown area of southern part of the study area, on fertile black and deep soil and irrigation facilities.
- The spatial distribution of bajara is exhibited as highest net sown area in sonkaswadi and Kololi village in the north and central part of the study region. Fifteen villages have 30 to 40 percent land

under bajara cultivation. The distribution of this crop is influenced by less rainfall amount, terrain characteristics and coarse shallow plateau soil.

- Sugarcane occupies second position after jowar which occupies 21.25 percent area. Sugarcane cultivation as identified maximum villages are located southern part of the Tahsil. Mostly which is an irrigated belt having deep black fertile soil.
- Fodder crops include Maize, kadwal and green grass, which occupy 12.71 percent area. And its cultivation is found in the areas of Dairy farming and livestock raising activity developed in northwest, southwest and central part in study region.
- Horticulture crops like pomegranate, grapes, Banana, chiku, watermelon and Guava's. Grapes, guavas, watermelon and pomegranate have been mostly cultivated in the north-western part of Tahsil. While banana, chiku and grapes are cultivated in the southern part of the Tahsil. These areas close to Baramati urban market places.

CONCLUSION

The study region, being the semiarid and drought prone, it does not show considerable fluctuation as far as the aerial extent of these crops are concerned. Among these crops, jowar shows during the study period (1990-91 to 2010-11) has steadily declined. The maximum hectarage of jowar declined in 2010-11 by 7.91 percent to total aerial extent of the study region. Sugarcane wheat, fruits and vegetable crops shown increasing trend during study period. Increasing irrigation facility is the main cause of this change in the study region. Crops like Bajara, fodder crops, oilseeds and pulses are slightly decreasing in Baramati tahsil. The spatial variation in landuse relates with the extent of these nine crops with soil characteristics, irrigation, relief, proximity to the market places and accessibility. The relationship among these factors are well established through agricultural landuse analysis of the region. Jowar is identified as first ranking crop occupying 22.44 percent to net sown area. This crop is mainly concentrated in north and central part due to

inadequacy of irrigation, undulating topography and unfertile soil. Sugarcane occupies second position after jowar is on 21.25 percent area. Wheat also has concentration in north on fertile, black and deep soil which favors the cultivation. Bajra is sown on 19984 hectares accounting for 19.2 percent to net sown area in study region. The distribution of this crop is influenced by rainfall amount, terrain characteristics and soil types. Fodder crop occupies 12.71 percent and its cultivation is found in areas of dairy farming and livestock raising activity developed in northwest, southwest and central parts in study region. Oilseed covers 2.85 percent. Fruits and vegetable contributes 1.98 and 1.02 percent in study region. Crops like pulses occupy 3.08 percent in the study region. It has been noted that among all the factors, soil, irrigation facilities and proximity to the market centres, control the spatio-temporal distribution of crops in the study region.

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