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2	Micro Study of Demographic Characteristics of Gaganbavda Tehsil in Kolhapur District	B. Aadhar' International Peer- Reviewed Indexed ResearchJournal I ISSN :2278-9308 March,2024	290-298
3.	सातारा जिल्ह्यातील भूमी उपयोजन कायक्षमतेचा अभ्यास	B. Aadhar' International Peer- Reviewed Indexed ResearchJournal I ISSN :2278-9308 March,2024	246-251

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75th Years of Indian Economy: Achievements and Challenges



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**Regional Trend Of Milk Production In Maharashtra State**
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Dr. N. D. Kashid- Patil⁴Assistant Professor, Shree Shahaji Chh. Mahavidyalaya, Kolhapur.^{1,3&4}
Assistant Professor, D. R. Mane Mahavidyalaya, Kagal.²**ABSTRACT**

Maharashtra is one of the states with the highest number of cattle and the highest amount of milk produced in the nation, but it also has the largest area under rainfed agriculture. Dairy farming industry in Maharashtra has shown tremendous growth in terms of milk production from 95.42MMT (2014-15) to 137.03MMT (2020-21). About 82% of cattle in rural areas are owned by small and marginal farmers as well as landless labourers who rely heavily on the selling of milk for their income. In addition to offering a wealth of job opportunities, this industry has stabilised agricultural income. The present research paper is an attempt to study the trend of dairy development in Maharashtra state. For the analysis Annual Average Growth Rate and Compound Annual Growth rate is used. The huge Milk strike and Covid-19 pandemic situation affected on growth of Milk Production.

Keywords: Region, Milk Production, AAGR, CAGR, Covid-19, etc.

Introduction:

Agriculture is the backbone of Indian economy as roughly 70-75% of the population depends directly or indirectly on agriculture. The expansion of the agriculture sector directly relates to the growth of the Indian economy. India's dairy industry has been growing slowly, and the country needs a technological revolution to satisfy the demands of its expanding population. In India's rural areas, dairy farming is an essential economic activity that is strongly entwined with agricultural systems. Of all the main Indian states, Maharashtra has the highest percentage of its land covered by rain 82 percent higher than the country as a whole (57 percent). Despite the state's predominance of rainfed lands, it ranks sixth in India for livestock population share at 6.8%. In the 2010-11 GDSP of agricultural and related activity sector, animal husbandry accounted for 12.8% of the total.

A very significant secondary occupation is dairy farming. One of the best ways to supplement farmers' income and create jobs in the rural economy is through dairying. Millions of underemployed and jobless people can find work thanks to it, especially small farmers and village labourers without land. Landless people and small farmers, who make up the economically disadvantaged segment of society, view dairying as a crucial source of additional revenue. For both old and young, vegetarians and non-vegetarians alike, milk is the most vital food source. For the customers, it is almost as crucial as their basic diet.

India ranks first in milk production, accounting for 18.5 per cent of world production, achieving an annual output of 146.3 million tonnes during 2014-15 as compared to 137.69 million tonnes during 2013-14 recording a growth of 6.26 per cent whereas, the Food and Agriculture Organization (FAO) has reported a 3.1 per cent increase in world milk production from 765 million tonnes in 2013 to 789 million tonnes in 2014. (Economic survey, 2015-16) States like Uttar Pradesh, Rajasthan, Andhra Pradesh, Gujarat, Madhya Pradesh, Maharashtra (stands at 7th rank with 6.60 per cent of milk production) Haryana, Karnataka, Bihar and West Bengal, had a progressive trend in production of milk while Uttar Pradesh remained the largest producer of milk during the entire period. (BAHS, 2015).

An increase in the number of animals or a significant gain in productivity and better stock utilization may be the cause of this significant rise in milk production. To determine the relative significance of these two factors in determining the production of milk, researchers have examined the contributions of these two factors, namely the quantity of milch animals and their productivity. Consequently, the goal of the current study is to investigate the patterns in the rise in milk output as well as the factors driving this expansion.

Data And Methodology :

The study will rely on secondary data that is accessible from both published and unpublished sources. Central and State government publications such as Economic Surveys of the Government of India, Reports, and data from the Department of Animal Husbandry would be the sources of figures and indicators. The Indian Ministry of Agriculture, the Maharashtra government's Directorate of Animal



Husbandry, and the Cooperative Dairy Federation. All India Livestock Census Reports, Statistical Outline of India of various years, National Accounts Statistics, Central Statistical Organization, Government of India, and NDDB would be the sources of statistics for comparison between states and between different years.

CAGR and AAGR methods will be used for this research. CAGR means Compound Annual Growth Rate and AAGR means Average Annual Growth Rate which shows trend of milk production.

$$\text{CAGR} = (\text{ending value} / \text{beginning value})^{(1/\text{No. of Periods})} - 1$$

$$\text{AAGR} = (\text{ending value} / \text{beginning value}) - 1$$

Result and Discussion :

Maharashtra is the third-largest state in the nation, covering an area of around 3 lakh square km. There are 35 districts. With 112.4 million residents, it is the second most populous state and union territory in all of India. Maharashtra is among the state in India with the highest rate of industrialization and urbanization, with 45% of its people living in cities. Maharashtra has five main regions: Vidarbha, Marathwada, Western Maharashtra, Khandesh and Konkan (Singh et al. 2004).

Table 1: Region Wise Milk Production

Year	Regions of Maharashtra					
	KOKAN	NASHIK	PUNE	AURANGABAD	AMARAVATI	NAGPUR
2014-15	5.14	25.28	38.25	16.81	4.82	5.12
2015-16	4.91	27.12	41.84	14.3	7.09	6.26
2016-17	4.98	28.07	42.99	16.48	6.77	4.73
2017-18	5.33	29.85	46.41	17.7	6.62	5.11
2018-19	5.52	33.34	49.57	17.04	6.1	4.97
2019-20	5.7	34.4	51.14	17.58	6.29	5.13
2020-21	4.64	36.68	62.41	20.86	6.51	5.93

Table 1 shows region wise milk production of Maharashtra's region like Kokan, Nashik, Pune, Aurangabad, Amaravati and Nagpur from 2014 to 2021 which includes pre covid pandemic era and during covid pandemic era. This research paper will analyze trend of milk production and impact of covid-19 pandemic on milk production.

Region wise Annual Average Growth Rate:

Annual growth rate, also called simple growth rate is a measure of the increase in the value in a given year. The annual average growth rate can be used to analyze growth over several years and is useful for identifying trends within a year.

Table 2 shows annual average growth rate of various region which is in Maharashtra state from year 2014 to 2021. As per above table the growth of milk production is gradually increasing from 2014 to 2019. But we can see that there is a slight decrease in milk production in year 2019 to 2021.



Table 2: AAGR of Region Wise Milk Production

Year	AAGR					
	KOKAN	NASHIK	PUNE	AURANGABAD	AMARAVATI	NAGPUR
2014-15 to 2015-16	-0.04475	0.072785	0.093856	-0.149315883	0.47095436	0.222656
2015-16 to 2016-17	0.014257	0.035029	0.027486	0.152447552	-0.045134	-0.24441
2016-17 to 2017-18	0.070281	0.063413	0.079553	0.074029126	-0.0221566	0.080338
2017-18 to 2018-19	0.035647	0.116918	0.068089	-0.037288136	-0.0785498	-0.0274
2018-19 to 2019-20	0.032609	0.061794	0.31672	0.131690141	0.03114754	0.32193
2019-20 to 2020-21	-0.18596	0.036279	0.22037	0.106575654	0.03497615	0.295945

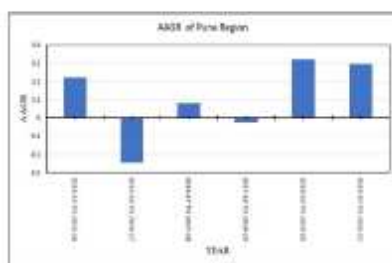


Fig. 1 AAGR of Pune Region

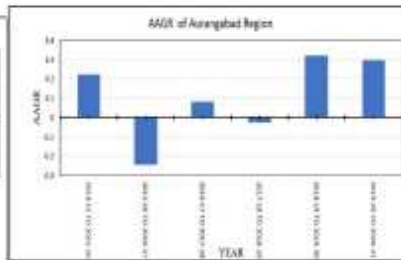


Fig. 2 AAGR of Aurangabad Region

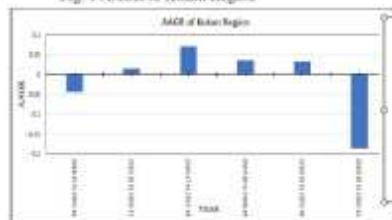


Fig. 3 AAGR of Kokan Region

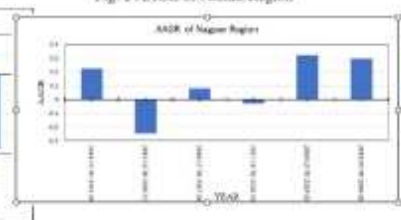




Fig. 3 AAGR of Pune Region

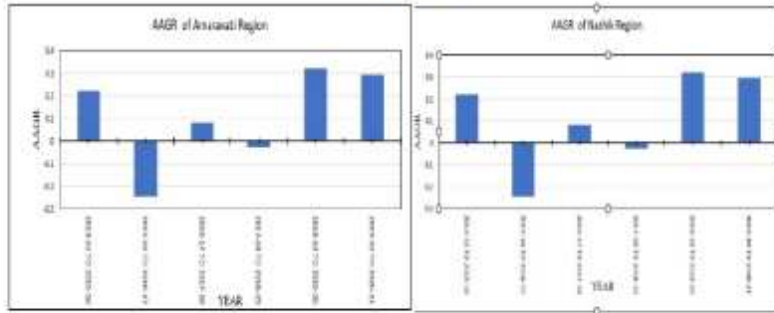


Fig. 5 AAGR of Amaravati Region

Fig. 6 AAGR of Nagpur Region

According to Fig 1 to 6 we can see annual average growth rate of Kokan, Nashik, Pune, Aurangabad, Amaravati and Nagpur region from the year 2014 to year 2021. If we analyze all the graph, we can conclude that there is not constant trend in milk production. Expected Kokan region all the remaining region has negative growth in the year 2015-16 to 2016-17, As well as from the year 2019 to 2021 the growth of milk production is decreased.

Region wise Compound Annual Growth Rate:

Compound Annual Growth Rate or CAGR is the annual growth of over a specific period of time.CAGR gives a single rate of growth that reflects the overall performance, making it easier to compare difference.

Table 2: CAGR of Region Wise Milk Production

REGION	CAGR
KOKAN	-0.015
NASHIK	0.0546
PUNE	0.0724
AURANGABAD	0.0313
AMARAVATI	0.0439
NAGPUR	0.0212

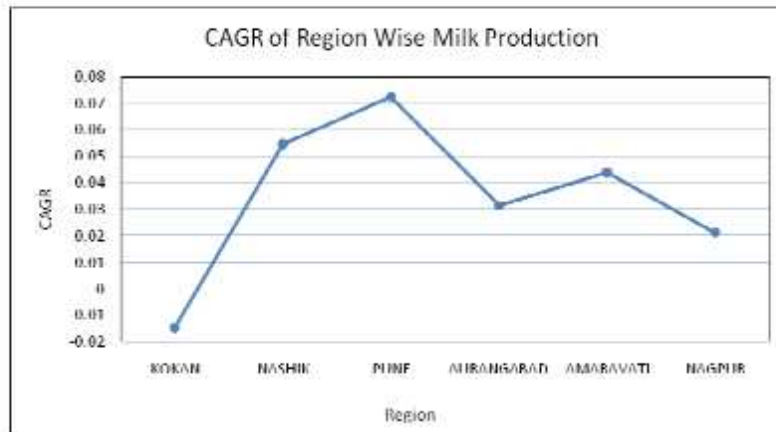


Fig 7 : CAGR of Region Wise Milk Production

Table 2 and figure 7 shows compound annual growth rate of Kokan, Nashik, Pune, Aurangabad, Amravati and Nagpur regions of Maharashtra from the year 2014 to 2021. Highest milk production is in Pune region and Lowest milk production is in Kokan region. Aurangabad region has average growth of milk production.

Conclusion

The Maharashtra state due to its many favorable endowments structural shift in the composition of milk production has also taken a possess a very high milk production potential. As per average annual growth rate of milk production there is not constant change in all the region of Maharashtra state. In the year 2015 to 2017 the milk production is decreased, only the exception is Kokan region. Only Kokan region has positive growth. May be the cause of decreasing growth in 2015 to 2017 is Milk strike. As well as we can see negative growth in during Covid- 19 Pandemic because in those days' lockdown was very strict. Increasing milk production is the need of growing population.

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Micro Study of Demographic Characteristics of Gaganbavda Tehsil in Kolhapur District

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Abstract: Population estimates are generally drawn from one point in time to study that particular area in a precise manner; Changes in population characteristics over time should be evaluated so that planning can address population problems in the region through economic development.

We assessed whether population characteristics such as Population Growth and Population Density remained stable and assessed population changes over time. The analysis was based on data from the 2001 and 2011 censuses of Gaganbavda tehsil of Kolhapur district, Maharashtra state, with adjustments for changes in geographical boundaries.

Variations in census data were quantified by summing, substituting, multiplying, dividing, and calculating percentages of change for each population characteristic. Between 2001 and 2011, positive and negative fluctuations in population size created a distinct pattern of population change that increased inequality in population and socioeconomic status. This study illustrates that important demographic changes must be taken into account when conducting proper research.

Keywords: Population Growth Rate, Population Density

Introduction: Demography is the study of a population, the total number of people or organisms in a given area. Understanding how population characteristics such as Population Growth Rate and Population Density can help demographers or governments make decisions. Population growth rate and population density are two key demographic concepts that describe aspects of a population's size and distribution.

Population density is often used as a simple relative measure of how an organism responds to local conditions. If conditions are not good for the species, the density will be low. In contrast, if conditions are good the density will be high.

Population growth rate refers to the percentage change in the size of a population over a specific period. It is a key indicator that helps us understand how a population is changing in terms of its size. Population growth is the increase in the number of people in a population within time and space.

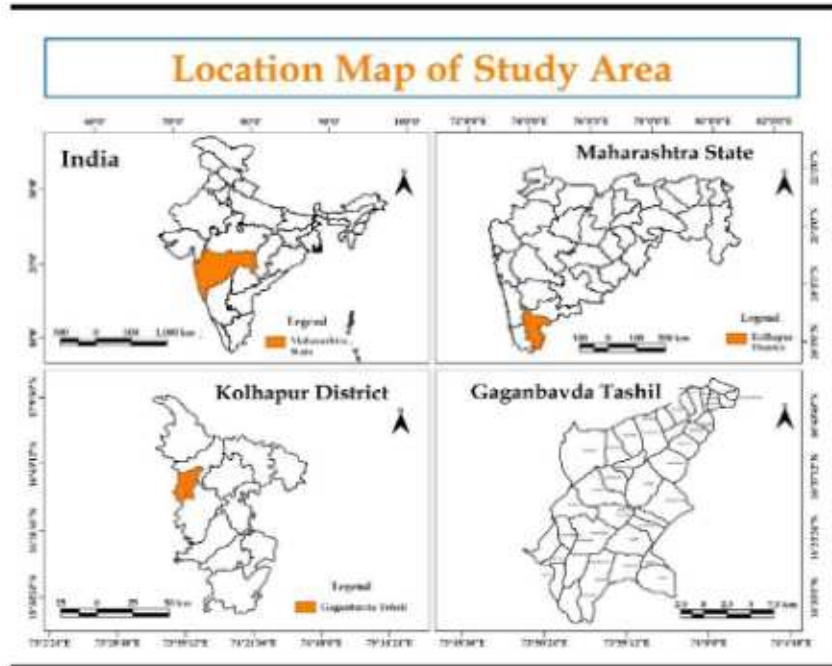
Population growth rate and population density are interrelated but distinct demographic indicators that provide valuable insights into the dynamics of a population and are essential for informed decision-making and planning.

The main purpose of the study is to determine the causes of population increase and decrease and analyze the current demographic situation. The study discusses, analyses, and evaluates the problems caused by the geographical setting.

Objectives:

- To compare the population growth rate of Gaganbavda Tehsil from 2001 to 2011.
- To analyze the population density of Gaganbavda Tehsil from the year 2001 to 2011

Study Area: Gaganbavda Tehsil is situated in the extreme western part of Kolhapur district i.e. on the Sahyadri range or the Western Ghats. The region extends between 16° 47' to 16° 72' North latitude and 73° 03' to 74° 81' East longitude and has a minimum elevation of 543 m and a maximum elevation of 985 m from mean sea level. It is surrounded by Panhala tahsil to the North, Radhanagari tahsil to the East and south, similarly Ratnagiri and Sindhudurg Districts to the West. The region or study area is of the hilly parts of the Western Ghats of Kolhapur district of South Maharashtra, occupying 342.07 Square Kilometers (34,207.77 hectares) with 4.45 % percent area of the district (7,685 Square Kilometers) and having only 55 km away from Kolhapur city.



Database: Primary data was collected through interviews with native peoples of the Gaganbavda tehsil. Secondary Data obtained from the census of 2001 and 2011. Some discussions were made with the native people of Gaganbavda tehsil. Socioeconomic Review and District Statistical Abstract of Kolhapur district, Dissertations, Books, Journals, and Articles, etc.

Methodology: Shifting population census characteristics have been observed at different geographic levels ranging from various aspects in this study. The study evaluated whether population characteristics remained static, and if not, assessed the degree of changes for some commonly used census variables across census data in Gaganbavda tehsil between 2001 and 2011.

The researcher used different formulas for each population's characteristics as follows-

- 1) To calculate the **Population Growth Rate**,
- $$\text{Population Growth Rate} = \frac{P_2 - P_1}{P_1} \times 100$$

Whereas, P_1 = initial population size i.e. Year 2001

P_2 = final population size i.e. Year 2011

The result of the Population Growth Rate is usually expressed as a percentage.

- 2) To calculate **Population Density**,

$$\text{Population Density} = \frac{\text{Population}}{\text{Total Land Area}}$$

- Computer Technique: The usual computer technique will be employed for the compilation, analysis, and presentation of secondary data.

Population Growth Rate of Gaganbavda Tehsil (2001-2011)

Population growth refers to the human population growth in a particular area during a specific time. Today population explosions refer to the twentieth century worldwide trend of enormous and rapid population growth, resulting from a birth rate higher than the death rate. The history of population growth is indicative of the constant struggle between Homo sapiens and nature and the success of man in adjusting, controlling, and modifying his environment.

At each stage of human development along with man's increasing ability to adjust to and control the environment, profound demographic changes have taken place. It is, therefore, necessary to study the course of population growth in the context of the course of the development of man (Bhende and Kanitkar 2004).

The process of growth of any section of the population varies with time and space. When the population increases between two given points of time in a region or territory it is known as growth. It brings changes in its overall composition and structure. Population growth is the function of three determinants fertility, mortality, and mobility.

The difference between human population fertility and mortality is called the natural increase of population. The process of growth of any section of the population varies with time and space. When the population increases between two given points of time in a region or territory, it is known as growth (Ramotra, 2008).

The difference between the number of births and deaths in a population over a given period contributes to natural increase. If births outnumber deaths, the population grows, and if deaths outnumber births, the population decreases. Migration, which involves people moving into or out of a region, can also contribute to population growth. Net migration is the difference between the number of people moving into a region and those moving out.

A positive growth rate indicates a population increase, while a negative rate signifies a decrease. A positive growth rate indicates a population increase, while a negative rate signifies a decrease. Understanding the population growth rate is crucial for policymakers, as it helps in planning for infrastructure, resources, and services to meet the needs of a changing population.

Table 1
Population Growth Rate (%) of Gaganbavda Tehsil (2001 - 2011)

Sr. No.	Village Name	Population Growth Rate (%)	Sr. No.	Village Name	Population Growth Rate (%)
1	Andur	2.85	24	Mandur	-11.72
2	Asalaj	24.92	25	Margewadi	12.73
3	Asandoli	10.41	26	Mhalunge	5.94
4	Balewadi(N.V)	0	27	Mutakeshwar	7.95
5	Baveli	26.67	28	Narveli	35.57
6	Borbet	2.54	29	Nivade	11.64
7	Chaudharwadi(N.V)	0	30	Padawalwadi(N.V)	0
8	Dhundavade	-19.18	31	Palsambe	-6.57
9	Gagan Bavda	-16.81	32	Pargaonkarwadi(N.V)	0
10	Garivade	17.39	33	Patilwadi(N.V)	0
11	Jambhulnewadi(N.V)	0	34	Saitavade.	-22.60
12	Jargi	20.73	35	Sakhari	14.26
13	Kadave	33.85	36	Salwan	-19.26
14	Katali	-29.26	37	Sangashi	6.12



15	Khadule	14.16	38	Sheloshi	8.54
16	Kherivade	21.63	39	Shenavade	7.38
17	Khokurle	15.01	40	Taliye Bk.	6.10
18	Kirave	8.76	41	Taliye Khurd	39.36
19	Kode Bk	17.30	42	Tisangi	-7.99
20	Kode Khurd	23.91	43	Vesaraf	11.23
21	Lakhamapur	-8.44	44	Vesarde	25.29
22	Longhe	6.79	45	Wetavde	5.46
23	Mandukali	-22.98	(N,V) = New village created before census 2011		

Source: Census of India 2001 and 2011

Average Population Growth rate in Gaganbavda Tehsil 2001-2011 is about 6.21 percent. A positive growth rate was recorded in Andur, Asalaj, Margewadi, Asandoli, Mhalunge, Mutakeshwar, Baveli, Narveli, Borbet, Nivade, Garivade, Jargi, Sakhari, Kadave, Sangashi, Khadule, Sheloshi, Kherivade, Shenavade, Khokurle, Taliye Bk., Kirave, Taliye Khurd, Kode Bk, Kode Khurd, Vesaraf, Vesarde, Longhe and Wetavde villages while a negative rate found in Dhundavade, Gagan Bavda, Katali, Lakhamapur, Mandukali, Mandur, Palsambe, Saitavade, Salwan and Tisangi villages. The villages with negative rates have fewer amenities available or not available within the village, so the villagers of these villages migrated to new places where basic facilities and amenities are abandoned.

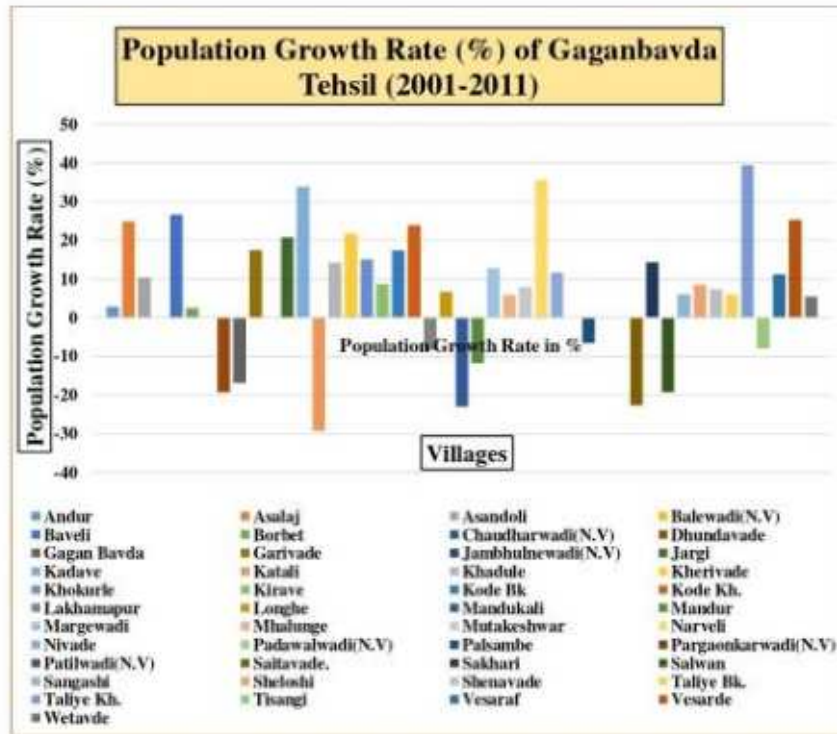
A low growth rate below 10 percent is found in 11 villages viz., Andur (2.84%), Borbet (2.54%), Kirave (8.76%), Longhe (6.78%), Mhalunge (5.94%), Mutakeshwar (7.95%), Sangashi (6.12%), Sheloshi (8.54%), Shenavade (7.38%), Taliye Bk (6.10%), and Wetavde (5.46%) etc.

In the moderate growth rate category which is ranged from 10-20 percent, there are 9 villages are belong to this category, Asandoli (10.41%), Garivade (17.39%), Khadule (14.16%), Khokurle (15.01%), Kode Bk (17.30%), Margewadi (12.72%), Nivade (11.64%), Sakhari (14.26%), and Vesaraf (11.23%) respectively.

In Gaganbavda tehsil 9 villages having high growth rates which are more than 20 percent are Asalaj (24.92%), Baveli (26.67%), Jargi (20.73%), Kadave (33.85%), Kherivade (21.63%), Kode Khurd (23.91%) Narveli (35.57%), Taliye Khurd (39.36%), Vesarde (25.29%), etc.

Balewadi, Chandharwadi, Padawalwadi, Pargaonkarwadi, Patilwadi, and Jambhulnewadi these villages having a constant rate because these villages are newly formed after the 2001 census and before the 2011 census.

The Andur has the very lowest growth rate because of a maximum number of families migrating towards the Kolhapur city or rural-urban fringe area for a job and livelihood therefore in this village population growth rate was much less. On the other side, Taliye Khurd Village recorded the highest growth rate in population because most of the households have fertile land and water for agricultural practices.



Population Size and Population Density of Gaganbavda Tehsil (2001-2011)

Population size refers to the total number of individuals in a given area, while Population density is the measurement of population per unit area, often expressed as the number of people per square kilometer. It provides an indication of how crowded or sparse a particular area is.

Areas with high population density have more people living in a given space. This can lead to increased competition for resources, congestion, and higher demand for infrastructure and services. Areas with low population density have fewer people spread over a larger area. This may result in a more spacious environment, but it could also mean challenges in providing services and infrastructure over vast distances.

Population density helps assess the concentration of people in a given space. Higher population density can lead to increased competition for resources and infrastructure challenges, while lower-density areas may face different social and economic dynamics. Population density is crucial for planning rural-urban areas, resource allocation, and understanding the ecological impact of human activities in a specific region (Malthus, 1798).

In any geographic space, as the population size increases, there is a tendency for population density to also increase. This is particularly true in rural areas such as Gaganbavda tehsil where some people inhabit a relatively small geographic space, leading to higher population density and vice versa.

Our research found that the average Population Density in Gaganbavda Tehsil in 2001 was 154 persons per sq. km. while in 2011 was 164 persons per sq. km. and the average Population Density in Gaganbavda Tehsil has increased by 6.49 percent from 2001 to 2011.

In sparsely populated regions such as Gaganbavda tehsil with a land area of 342.07 sq. km., the population density is low because of high topography, climate (heavy rainfall up to 7000 mm), dense forest, water shortage in the summer season, economic activities (mostly primary), lack of education, and lukewarm government policies. These factors are influencing population density independently.

For instance, regions such as the rural-urban fringe area of Kolhapur have favourable conditions for agriculture, and the city of Kolhapur with its potential for industrial development attracts more people from Gaganbavda tehsil, leading to higher population density here.

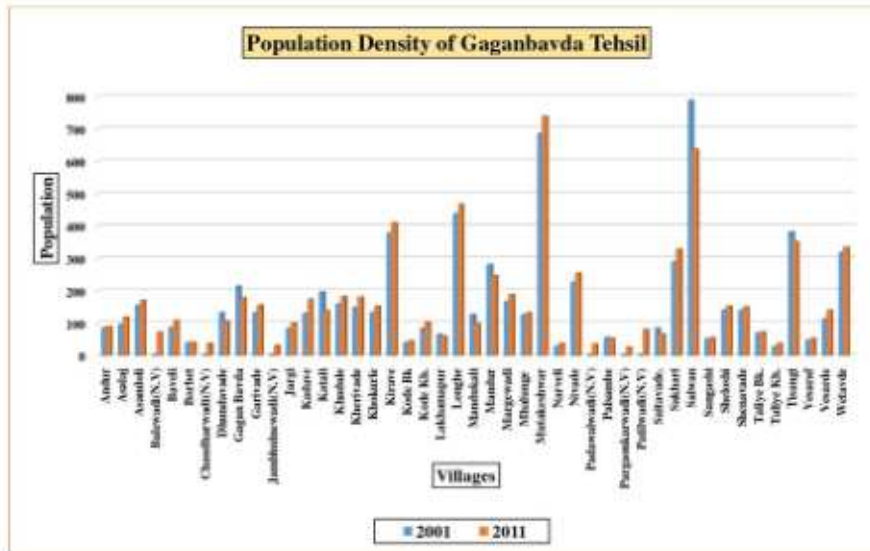
Padawalwadi, Pargaonkarwadi, and Jambhalnewadi are the villages found with low Population Density while Mutakeshwar, Salwan, Kirave, and Longhe these villages recorded high Population Density as per the 2011 census. Mandur, Dhundavade, Palsambe, Gaganbavda, Saitavade, Katali, Lakhamapur, and Mandukali are examples of villages that recorded a decrease in their population density from 2001 to 2011.

Some villages have the very lowest population density because either the administrative area of that village is low or a maximum number of households migrating towards the Kolhapur city or rural-urban fringe area for survival therefore in this village population density was much less. On the other hand, some villages recorded the highest population density because either the administrative area of that village is high or most of the people have basic facilities and amenities in that particular region. For instance, fertile land and water for agricultural practices, availability of education, job opportunities, and more accessibility (good network of roads, availability of means of communication).

Table 2
 Population Size and Population Density (sq. km) of Gaganbavda Tehsil (2001 – 2011)

Village Name	Population Size		Population Density/Sq. km		Village Name	Population Size		Population Density/Sq. km	
	2001	2011	2001	2011		2001	2011	2001	2011
Aadur	1088	1119	85	88	Mandur	1365	1305	279	246
Asada]	1296	1619	95	119	Margewadi	275	310	167	188
Asandoli	1355	1406	155	171	Mhalunge	219	252	125	133
Balewadi (N.V)	0	421	0	72	Mutakeshwar	704	760	683	738
Bavli	825	1045	86	109	Narvdi	194	263	27	36
Bubhat	629	645	39	40	Nivade	1100	1228	226	253
Chaudharwadi (N.V)	0	445	0	36	Padawalwadi (N.V)	0	429	0	35
Dhundavade	1616	1306	132	107	Palsambe	502	469	55	52
Gagan Bavda	1909	1588	213	177	Pargaonkarwadi (N.V)	0	398	0	24
Garivade	667	783	132	155	Patilwadi (N.V)	0	393	0	80
Jambhalnewadi (N.V)	0	268	0	30	Saitavade.	1385	1072	85	66
Jargi	772	932	83	100	Sakhart	989	1130	287	328
Kadavu	452	605	129	173	Salwan	244	197	787	635
Katali	769	544	195	138	Sangashi	343	364	51	54
Khadule	452	516	159	181	Shelshi	632	686	140	151
Kherivade	578	703	148	180	Shenavade	383	626	139	149
Khokarle	1019	1172	132	152	Taliye Bk.	607	644	68	73
Kirave	1073	1167	376	409	Taliye Khurd	282	393	26	37
Kode Bk	838	983	38	45	Tisangi	2226	2048	381	350
Kode Khurd	548	679	83	103	Vesaraf	472	558	47	63
Lakhamapur	486	443	64	59	Vesarde	526	659	111	139
Longhe	781	834	436	466	Wetande	1153	1216	317	334
Mandukali	1571	1210	127	98	(N.V) = New village created before census 2011				

Source: Census of India 2001 and 2011



Results:

First of all, the researcher should keep in mind that although Gaganbavda tehsil is 50-60 km away from Kolhapur city it is a rural as well as remote area. This area is mostly covered by dense evergreen forest. As well as this region rain falls up to 7000 mm which is why it is considered as ‘Paradise of Kolhapur District. So, in this hilly and dense forest region, a low population exists.

The article notes that according to the 2011 census more than 36,000 persons live on the land of Gaganbavda tehsil has made it low populated tehsil. The physical setting is responsible for the backwardness of the peoples of the Gaganbavda tehsil. Due to elevated terrain and Ghat sections, there is very low accessibility. e.g. In 2017, Gaganbavda and Dhundavade village crop yield was very low because leaves decomposed on the crop due to heavy rainfall.

Lakhamapur village has a low growth rate of population because the Kumbhi dam is constructed over the agricultural and residential lands of farmers due to only this dam they all migrated towards neighboring villages or Kolhapur city for shelter.

From this research, the researcher found that 6 new villages were created during the 2011 census. The present study mainly focused on population characteristics, so the following results were extracted.



Villages with High Population Growth Rate	Kadave, Narveli, Taliye Khurd
Villages with Low Population Growth Rate	Dhundwade, Gaganbavda, Katali, Mandukali
Villages with High Population Density	Mutakeshwar, Salwan, Kirave, Longhe
Villages with Low Population Density	Padawalwadi, Pargaonkarwadi, Jambhulnewadi
Villages with High Population Size	Asalaj, Gaganbavda, Tisangi
Villages with Low Population Size	Mhalunge, Narveli, Jambhulnewadi , Taliye Khurd

Conclusions:

During research, the researcher found that the average Population Density in Gaganbavda Tehsil in 2001 was 154 per sq. km. and in 2011 was 164 sq. km. Our research found that the Average Population Density in Gaganbavda Tehsil has been increasing by 6.49 percent.

In summary, our findings illustrate that regarding population growth rate and population density both analyzed in this study, both the population characteristics changed considerably. The average Population Growth rate in Gaganbavda Tehsil from 2001 to 2011 is about 6.21 percent.

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**सातारा जिल्ह्यातील भूमी उपयोजन कार्यक्षमतेचा अभ्यास*****श्री. तेजस चव्हाण **डॉ. डी. एल. काशिद-पाटील ***श्री. गौरव काटकर**

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भूमी उपयोजन आणि भूमी उपयोजन कार्यक्षमता कृषी नियोजनात महत्त्वाची भूमिका बजावते. जमीनीचा मानवाने विविध कारणांसाठी वापरलेला किंवा वापरला जाणारा भाग हा भूमी उपयोजन म्हणून ओळखला जातो. भूमी उपयोजन कार्यक्षमता ही एकूण पीक क्षेत्र आणि निव्वळ पेरणी केलेले क्षेत्राचे प्रमाण आहे. कृषी भूगोल ही मानवी भूगोलाची एक प्रमुख विद्याशाखा असून ती शेती संबंधीच्या अवकाशीय पद्धतीचा वैज्ञानिक अभ्यास करते. मानवाच्या मूलभूत गरजांची पूर्तता करण्यासाठीचे हे एक प्रमुख साधन आहेच शिवाय या गरजांच्या स्वरूपानुसार भूमीचा वापर मानवाकडून केला जातो. उदा. शेती, वाहतूक, पर्यटन, कच्चा मालावर प्रक्रिया करणारे उद्योग इ. म्हणूनच जमीन हे एक नैसर्गिक संसाधन असून ते उत्तर सर्व संसाधना मध्ये महत्त्वाचे संसाधन आहे. भूमी उपयोजन ही मानवी भूगोलातील फार महत्त्वाची संकल्पना आहे. कारण याच्या मदतीनेच प्रादेशिक, आर्थिक, सामाजिक, सांस्कृतिक दिकासाच्या स्वरूपाचा अभ्यास करणे सोपेच होते. परंतु वाडलट भूमी उपयोजन जर अयोग्य प्रकारे झाल्यास प्रादेशिक, आर्थिक, सामाजिक, सांस्कृतिक विकास झालेला दिसून येत नाही. भूमी उपयोजन हे प्रदेशाच्या विकासाचा परिपाक असतो.

मानवाने अनेक कारणांसाठी भूमीचा जो प्रत्यक्ष वापर केलेला असतो त्याला भूमी उपयोजन असे म्हणतात. भूमी उपयोजन हे विशिष्ट वेळेला विशिष्ट ठिकाणी विकसित आणि अविकसित अशा दोन्ही प्रकारच्या जमिनीत केले जाते. भूमी उपयोजन स्थळ आणि काळ सापेक्ष आहे. दोन वेगवेगळ्या प्रदेशातील भूमी उपयोजन तंतोतंत सारखे नसते. तसेच पूर्वी ज्या कारणांसाठी भूमीचा वापर केलेला होता, त्याच कारणांसाठी त्याचा सद्यपरिस्थितीतील वापर त्याचसारखा असेल असे नाही. मानवाच्या गरजा स्थळ आणि काळानुसार बदल असल्याने, भूमी उपयोजनातही स्थळ व काळ सापेक्ष बदल दिसून येतो.

भूमी उपयोजन करत असताना जमिनीचा जो भाग शेतीसाठी वापरात आणला जातो त्याला कृषीभूमी असे म्हंटले जाते. निव्वळ लागवडीखालील क्षेत्र आणि पाडीत क्षेत्र वगळून इतर लागवडीखाली नसलेले क्षेत्र यांचा समावेश कृषी भूमी उपयोजनात होतो.

उपलब्ध असलेल्या जमिनीत पिके घेऊन पुन्हा लागवडीसाठी जमीन तयार करणे यास भूमी उपयोजन कार्यक्षमता म्हणतात. एकूण पिका खालील क्षेत्र आणि निव्वळ पिकाखालील क्षेत्र यांचे गुणोत्तर भूमी उपयोजन कार्यक्षमता दर्शविते. नैसर्गिक संसाधन व्यवस्थापनासाठीचे उपाय विकसित करण्यासाठी भूमी उपयोजन कार्यक्षमतेचा अभ्यास महत्त्वपूर्ण आहे.

अभ्यास क्षेत्र

प्रस्तुत संशोधन निबंधासाठी पश्चिम महाराष्ट्रातील सातारा जिल्ह्याची निवड अभ्यासक्षेत्र म्हणून करण्यात आलेली आहे. या जिल्ह्याचा विस्तार १७.५ आणि १८.११' उत्तरअक्षवृत्त ते ७३.३३' ते ७४.५४' पूर्व रेखावृत्ताच्या दरम्यान आहे. जिल्ह्याचे भौगोलिक क्षेत्रफळ १०४८० चौ.कि.मी. असून राज्याच्या ३.४१% इतके क्षेत्र व्यापले आहे. २०११ च्या जनगणनेनुसार जिल्ह्याची लोकसंख्या ३०.०३,७४१ एवढी आहे. जिल्ह्यात एकूण १७४१ गावे आहेत. जिल्ह्याच्या उत्तरेस पुणे, वायव्येस रायगड, पूर्वेस सोलापूर, पश्चिमेस रत्नागिरी आणि दक्षिणेस सांगली या जिल्ह्यांच्या सीमा लागून आहेत. प्रशासकीय दृष्टीने जिल्ह्याची सातारा, कराड, वाई, महाबळेश्वर, फलटण, माण, खटाव, कोरेगाव, पाटण, जावळी आणि खंडाळा अशा एकूण ११ तालुक्यांमध्ये विभागणी करण्यात आलेली आहे.



माहिती स्रोत व संशोधन पद्धती

प्रस्तुत संशोधन निबंध पूर्णतः द्वितीयक स्वरूपाच्या माहितीवर आधारलेला आहे. ही माहिती, जिल्हा सामाजिक व आर्थिक संपवारा २०१५, जनगणनापुस्तिका २०११, इत्यादी मधून मिळविलेली आहे. माहितीचे सांख्यिकीय रचन करून ती द्यावा पद्धतीच्या नकाशाद्वारे प्रदर्शित करण्यात आलेली आहे. भूमी उपयोजन कार्यक्षमता निर्देशांक काढण्यासाठी पुढील सूत्राचा वापर करण्यात आलेला आहे.

एकूण पिकाखालील क्षेत्र

$$\text{भूमी उपयोजन कार्यक्षमता} = \frac{\text{निव्वळ पिकाखालील क्षेत्र}}{\text{एकूण पिकाखालील क्षेत्र}} \times 100$$

वरील सूत्राच्या सहाय्याने भूमी उपयोजन कार्यक्षमता काढून जास्त, मध्यम आणि कमी अशा तीन गटात विभागीय करून विश्लेषण करण्यात आलेले आहे.

उद्दिष्टे

१. तातुकांनिहाय भूमी उपयोजन कार्यक्षमतेचा अभ्यास करून त्यावरील नैसर्गिक घटकांचा प्रभाव समजून घेणे.
२. सातारा जिल्ह्यातील भूमी उपयोजन कार्यक्षमतेच्या समस्यांचा अभ्यास करून उपाययोजना सुचविणे.

भूमीउपयोजन

एखाद्या क्षेत्राचा जमीन वापराचा नमुना हा त्या क्षेत्राचे भूउठाव, हवामान, मातीची रचना आणि सामाजिक-आर्थिक घटक यांच्यातील परस्परसंबंधाचा एकत्रित परिणाम असतो. जमिनीचा दुरुपयोग टाळण्यासाठी आणि प्रदेशाच्या पर्यावरणीय समतोलाला बाधा न आणता जमिनीच्या प्रत्येक तुकड्याच्या इष्टतम वापरासाठी भूमी उपयोजनाचा अभ्यास आवश्यक आहे. अभ्यास क्षेत्रातील जमिनीच्या वापराच्या पद्धतीचा अभ्यास एका वेळी वेगवेगळ्या जमिनीच्या वापराखालील क्षेत्राचे प्रमाण समाविष्ट करतो.

अभ्यास क्षेत्राचा जमीन वापर नमुना तक्ता क्रमांक १ मध्ये दर्शविला आहे, अभ्यास क्षेत्राचे भौगोलिक क्षेत्र १०,५८,२४३ हेक्टर आहे. क्षेत्राच्या एकूण भौगोलिक क्षेत्राच्या तुलनेत शेतीखालील क्षेत्राचे प्रमाण ५२.६९ % आहे. एकूण भौगोलिक क्षेत्रापैकी २२.८४% क्षेत्र हे पडीक जमिनीखाली आहे, तर १३ % जमीन जंगलव्याप्त आहे आणि ११.४७ % जमीन वसाहती, उद्योग आणि बाह्यतुक क्षेत्राने व्यापलेली आहे त्यामुळे ती लागवडीसाठी उपलब्ध नाही.

तक्ता क्र. १ सातारा जिल्ह्यातील तातुकांनिहाय भूमी उपयोजन

तातुका	एकूण भौगोलिक क्षेत्र (हेक्टर मध्ये)	जंगलव्याप्त %	लागवडीसाठी उपलब्ध नसणारी जमीन %	पडीक जमीन %	शेतीखालीलक्षेत्र %
महाबळेश्वर	२२१९०	५९.६६	३.७७	७.७६	२८.८२
वाई	६१९०९	२०.६२	४.८१	१५.२९	५९.२८
वांढाळा	५३६०८	१२.१२	१७.५०	२८.२६	४२.११
फलटण	११९०२९	९.१५	१४.१०	३१.१८	४५.५७
माण	१५०७८७	८.५९	१६.७६	३६.०७	३८.५८
खटाव	१३६४५७	३.०२	८.२८	२०.९६	६७.७४
कोरमाव	९४८४०	११.०७	९.३३	२२.७८	५६.८३
सातारा	८७९५३	९.६६	१४.६७	१७.७४	५७.९३
जावळी	८६८९५	२२.७७	१३.०९	२१.२५	४२.९०
पाटण	१४०३६४	१९.७५	११.२७	२२.९६	४६.०३
कराड	१०४२११	१०.१७	९.७१	७.०३	७७.०९



सातारा जिल्हा	१०५८२४३	१३.००	११.४७	२२.८४	५२.६९
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आकृती क्र. १

जंगलव्यास

जिल्ह्याचा पश्चिम भाग सह्याद्री डोंगरराळ प्रदेशाने व्यापलेला आहे त्यामुळे या डोंगरराळ प्रदेशात थनदाट जंगल आहे. जिल्ह्यातील १३% जमीन जंगलाने व्यापलेली आहे. जंगलाचे तालुकानिहाय वितरण वैविध्य दाखवते. महाबळेश्वर तालुक्यात सर्वाधिक क्षेत्र म्हणजे ५९.६६% तर खंडाळ तालुक्यात सर्वात कमी म्हणजे ३.०२% क्षेत्र वनाच्छादन आहे. (आकृती क्र. १) सर्वसाधारणपणे अभ्यास क्षेत्राच्या पश्चिमेकडून पूर्वेकडे जंगलाचे प्रमाण कमी होत आहे कारण प्रदेशाचा पूर्व भाग हा दुष्काळी प्रदेश आहे. निमसदाहरित पावसाळी जंगले अभ्यास क्षेत्रात आहेत.



आकृती क्र. २

लागवडीसाठी उपलब्ध नसणारी जमीन

या गटामध्ये विंगर शेती वापराखालील जमीन, नापीक आणि शेती न करता येणारी जमीन समाविष्ट आहे. विंगर शेती वापराखालील क्षेत्रामध्ये इमारती, रस्ते आणि लोहमार्ग, पाणी साठे इत्यादींनी व्यापलेली जमीन समाविष्ट आहे. नापीक आणि शेती नसलेल्या जमिनीमध्ये खडकाळ आणि डोंगरराळ भाग आणि निसर्गातील दुर्मि भागाचा समावेश होतो. (आकृती क्र. २) अभ्यास क्षेत्रात अशा जमिनीचे सरासरी प्रमाण ११.४७% आहे. सर्वाधिक प्रमाण माण (१६.७६%) तालुक्यामध्ये आणि सर्वात कमी महाबळेश्वर (३.७७%) तालुक्यामध्ये आढळून आले.

पडीक जमीन

पडीक जमीन म्हणजे जी जमीन सध्या लागवडीखाली नाही पण पूर्वी ती लागवडीखाली होती. ती सध्याची पडीक आणि कायम पडीक जमीन अशा दोन गटात विभागली जाऊ शकते. अभ्यास क्षेत्रात २२.८४% पडीक जमीन आढळून आली आहे. तहसील स्तरावर, खंडाळा (२८.२६%), फलटण (३१.१८%), माण (३६.०७%) आणि पाटण (२२.९६%) तालुके आणि उर्वरित तालुके जिल्हा सरासरीपेक्षा कमी आहेत. (आकृती क्र. ३) कटाड (७.०३%) तहसीलमध्ये सर्वात कमी पडीक जमीन आणि माण (३६.०७%) येथे सर्वाधिक पडीक जमीन आढळून येते.



आकृती क्र. ३

शेतीखालीलक्षेत्र

बाणू बर्वात जी जमीन प्रत्यक्षात पिकाखाती असेच तिचा शेतीखालील क्षेत्र किंवा निव्वळ लागवडीखालील क्षेत्र म्हणतात. अभ्यास क्षेत्रात जवळपास ५२.६९% जमीन विविध पिकाखाली आहे. निव्वळ लागवडीखालील क्षेत्राचे सर्वाधिक प्रमाण कराड(७७.०९%), खटाव (६७.७४%), वाई (५९.२८%), सातारा (५७.९३%) आणि कोरेगाव (५६.८३%) या तालुक्यांमध्ये आढळून आले आहे जे जिल्ह्याच्या सरासरीपेक्षा जास्त आहे. (आकृती क्र. ४) हे सुपीक माती आणि पाण्याची उपलब्धता यामुळे दिसून येते. हा प्रदेश कृष्णा - कोयना नदी खोऱ्यात येतो. डोंगराळ प्रदेशामुळे निव्वळ पेरणी क्षेत्राचे सर्वात कमी प्रमाण महाबळेश्वर (२८.८२%) तालुक्यामध्ये आढळते.



आकृती क्र. ४

भूमी उपयोजन कार्यक्षमता

अभ्यास क्षेत्रात पडीक व सुपीक शेतजमीन लागवडीखाली आणून लागवडीखालील जमिनीचा विस्तार करण्यास बाब आहे. त्यामुळे पिकांच्या तीव्रतेवर अधिक भर देण्याची आणि सध्याच्या मोजलेल्या क्षेत्रातून उत्पन्न वाढविण्यावर तात्काळ भर देण्याची गरज आहे. निव्वळ लागवड क्षेत्राचा कमी वापर आणि पीक खराब होण्याचा धोका यामुळे श्रावणी लोकसंख्येला वास्तदायक ठरत आहे. म्हणून, निव्वळ पेरणी केलेल्या क्षेत्राचा वापर किती तीव्रतेने केला जातो हे तयारपणे फलदायी ठरते. भूमी उपयोजन कार्यक्षमतेची व्याख्या निव्वळ लागवड केलेल्या क्षेत्रफळाच्या प्रमाणात केली जाऊ शकते. निव्वळ लागवड केलेल्या क्षेत्राची एकूण पीक क्षेत्र टक्केवारी भूमी उपयोजन कार्यक्षमतेचे मोजमाप देते. भूमी उपयोजन कार्यक्षमतेचा निर्देशांक खालील सूत्र वापरून प्राप्त केला जातो.

निव्वळ लागवड क्षेत्र

भूमी उपयोजन कार्यक्षमतेचा निर्देशांक = ----- × १००

एकूण पीक क्षेत्र

तक्ता क्र. २ सातारा जिल्ह्यातील भूमी उपयोजन कार्यक्षमता

तालुका	एकूण पीक क्षेत्र (हेक्टर मध्ये)	निव्वळ लागवड क्षेत्र (हेक्टर मध्ये)	भूमी उपयोजन कार्यक्षमतेचा निर्देशांक %
महाबळेश्वर	८११६	६४६८	७९.६९
वाई	४६१६७	५०११२	१०८५.५
खंडाळा	३७७२६	४०९०३	१०८४२



फलटण	११३५३	३४४१९	७०५२.
माण	११२५६४	५५८५१	४९६२.
खटाव	१२१०४१	८३४२८	६८९३.
कोरेगाव	७५५७७	६८८१७	९१०६.
सातारा	६६४०९	९२१५८	१३८७७.
जावळी	५५७२१	४५३५५	८१४.
पाटण	९६८०९	९२९५०	९६०१.
कराड	८७६४०	९५२७८	१०८७२.
सातारा जिल्हा	७९९१२३	६९५७३९	८७०६.

कमी कार्यक्षमतेचे क्षेत्र (७५% पेक्षा कमी)

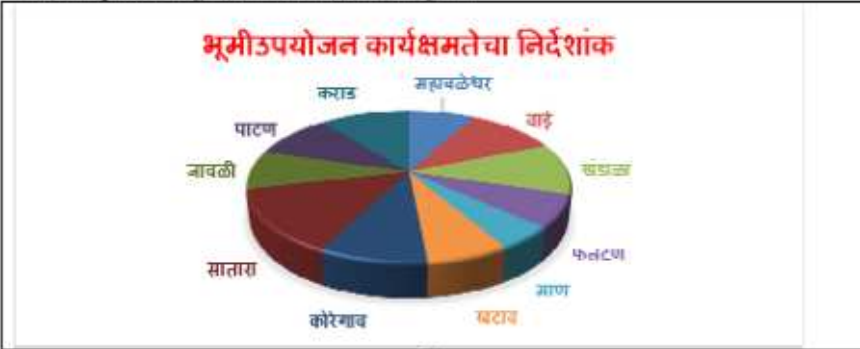
प्रस्तुत संशोधनात तत्का क्र. २ वरून असे दिसून येते की, कमी कार्यक्षमतेचे क्षेत्र माण (४९.६२%), खटाव (६८.९३%) आणि फलटण (७०.५२%) तालुक्यामध्ये दिसून येते सदर चा प्रदेश हा दुष्काळी आणि पर्जन्य छायेचा असल्यामुळे वाटिकाची पाण्याची टंचाई तसेच जलसिंचनाच्या सोयीचा अभाव या कारणांमुळे कृषीय सुपीक जमिनीचे भूमीउपयोजन कार्यक्षमता निर्देशांक कमी आहे.

मध्यम कार्यक्षमतेचे क्षेत्र (७६% ते १००%)

प्रस्तुत संशोधनात तत्का क्र. २ वरून असे दिसून येते की, मध्यम कार्यक्षमतेचे क्षेत्र महाबळेश्वर (७९.६९%), कोरेगाव (९१.०६%), जावळी (८१.४०%) आणि पाटण (९६.०१%) इतके मर्यादित आहेत. या तालुक्यामध्ये सिंचन, सुपीक जमिनीची परिस्थिती चांगली आहे परंतु सध्या डोंगराळ प्रदेश, जलसिंचनाच्या सोयीचा अभाव, पारंपारिक शेती, शेतजमिनीचा लहान आकार, तीव्र उतार असल्याने वार्षिक सरासरी पावसाचे प्रमाण चांगले असून देखिल मध्यमभूमीउपयोजनकार्यक्षमतेचा निर्देशांक मध्यम आहे.

उच्च कार्यक्षमतेचे क्षेत्र (१००% पेक्षा जास्त)

प्रस्तुत संशोधनात तत्का क्र. २ वरून असे दिसून येते की, सातारा (१३८.७७%), कराड (१०८.७२%), वाई (१०८.५५%), खंडाळा (१०८.४२%), या तालुक्यांमध्ये उच्च तीव्रता निर्देशांक आढळून आला, कारण चांगल्या विकसित सिंचन सुविधा, काळवा मातीसह सुपीक मैदानी प्रदेश तसेच विकसित कृषी तंत्रे, दाट लोकसंख्येमुळे बाजारपेठेचे साविध्य यामुळे प्रदेशात भूमीउपयोजनाची उच्च तीव्रता दिसून येते.



आकृती क्र. ५

निष्कर्ष

अभ्यास क्षेत्रांमध्ये जंगलाखालील क्षेत्र कमी आहे ते साधारण १३ % इतके आढळून आले आहे. त्यात वनीकरण बांधण्याची गरज आहे. अभ्यास क्षेत्रात निव्वळ पेरणी क्षेत्र लक्षणीय आहे. मुळात नदीपाठच्या सुपीक मैदानी प्रदेशात लागवडीखाली जास्त क्षेत्र आहे. अभ्यास क्षेत्राच्या पूर्वेकडील भागात पडीक जमिनीचे प्रमाण जास्त आहे, ज्याला



सिंचनाची सुविधा देऊन लागवडीखाली आणता येते. वाई, खंडाळा, सातारा आणि कराड या तालुक्यांमध्ये भूमीउपयोजन कार्यक्षमता जास्त आहे कारण सिंचनाची उत्तम सोय आणि काळवा मार्गीसह सुपीक मैदानी प्रदेश. डोंगराळ तसेच पूर्वेकडील अश्याम क्षेत्रांमध्ये कृषी विकासामाठी योग्य कृषी धोरणाची गरज आहे.



आकृती क्र. ४

संशोधकाद्वारे संकलित

संदर्भ:

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