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Spatial Interrelationship between Land Use, Cropping Pattern and Population in the River Basins of Raigad District (MS)

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ABSTRACT

Raigad is famous district in term of historically. But this identity is become due to identical physiography. River basin is identical unit of study. Many geographers considered the importance of river basin for regional development. Patalganga, Amba, Kundalika, Mhasala, Savitri are the major west flowing river which covers most of area of the district. Patalganga river basin is densely populated basin while Savitri river basin noticed very low population density. Cropping intensity is influenced by multiple interacting factors rather than any single variable but water availability through rainfall and irrigation generally supports higher cropping intensity.

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1. Introduction

River basin means a natural hydrological unit drained by a river and its tributaries where all precipitation collects and flows toward a common outlet. It is distinct physiographic landscape because the morphology of a basin is determined by topography, climate, geology, soil type, and vegetation. The Basin area is a very important geographical feature. It determines water availability, soil formation, landuse pattern, population distribution, and agricultural prosperity and development of the region. Landuse refers to the use of land for various economic and cultural activities. In a river basin, landuse reflects the interplay between natural resources and human needs. Because river basins generally have fertile soils, adequate water supply, and gentle relief, they show a diverse and intensive landuse structure. Cropping intensity measures how frequently the agricultural land is used during a year. Cropping intensity is determined by water availability, soil fertility, climate, agricultural technology, and socio-economic factors. Generally the single crop pattern can see in the upper catchments area where there is steep slops are presents. Double cropping pattern can see in the middle basin area while the triple cropping pattern can found in well irrigated floodplain and deltaic areas. Population is dynamic factor in geography. It changes the entire structure of basin. It determines the land use, cropping pattern in the basin.

Raigad is an important district in Maharashtra which situated in Konkan area. District is contributed in large scale to Maharashtra's development in terms of national income, tourism, employment opportunities, forest and fisheries income, transport etc. River basin is an identical physical parameter for the regional study of area. Many geographers have considered River basin is natural unit for study. The most of basin area of Patalganga, Amba, Kundalika, Mhasala, Savitri are lies in the district therefore these basin area is considered for the study. Land is important resource which changes constantly. Cropping pattern also constantly change due to socio-economic geographical and technological factor. Population is responsible factor for all these.

2. Methods and Material

Objective

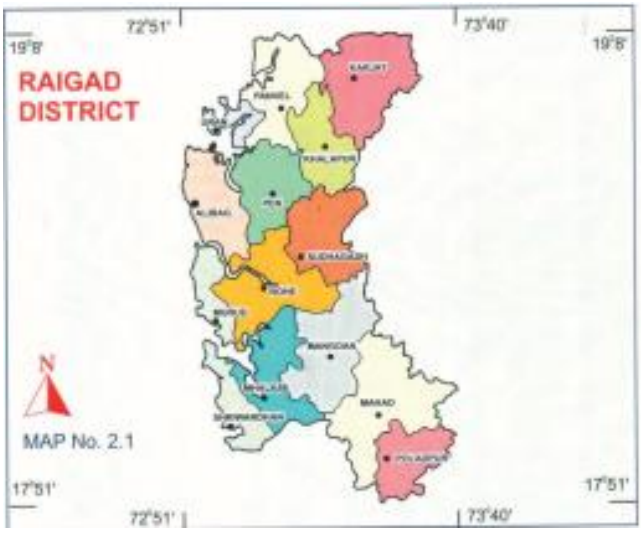
1. To study the basin wise land use pattern with population resources.
2. To identify the spatial relationship between population, land use and cropping intensity.

Study area

Raigad district is extended between 17o 51'and 19o 80' N latitude and 72o 51' and73o 40' E longitude. It is located 10 to 50 metres altitude above mean sea level (MSL). It covers 240 km out of 720 km coastal length of Arabian Sea and surrounded by Sahayadri ranges (Western Ghat) in the east, the Arabian Sea on the west. The political boundary of the district

is surrounded by Mumbai Suburban district to the northwest, Thane district to the north, Pune district to the east, Ratnagiri district to the south and Satara district to the south east.

The average rainfall per annum in the town is 2164.5 millimetres and the maximum temperature is 36.7° Celsius and the minimum temperature is 13.5° Celsius. Summers in Raigad is sweltering as the temperatures go up high making the days quite hot. Although summers begin to hit Raigad by the end of March, the slightly warmer days and cool nights create a good time for tourism.



Data Source and Methodology

The present research paper is based on secondary data. Data collected form Konkan Irrigation Development Corporation, Government of Maharashtra Water Resources Department. Percentage analysis tool is used for the study of basin wise land use pattern. Mean, Standard Deviation is calculated for the study of relation between variables. Graphs and charts used to represent the data.

Limitation

There are five major rivers flowing through the Raigad District, namely Ulhas, Patalganga, Amba, Kundalika, Mhasala, and Savitri. The Ulhas River flows through only two tahsils of Raigad District, while most of its basin area lies in Thane District. Hence, the entire Ulhas River basin is not confined within Raigad District. Since this study focuses on river basins within Raigad, and the Ulhas River covers only a limited portion of the district, it has been excluded from the present study due to data limitations for those specific tahsils

3. Result and Discussion:

Table No.1

Land Use Pattern In Major River Basin In Raigad District

Sr. No	River Basin	Total Geographical Area	Population	Density Per sq.Km	Land Use in %							
					Permanent Pasture	Tree and Groves	Fallow land	Cultivable Area	Forest	Barren& Uncultivable	Non-Agriculture use	Waste land
1	Patalganga	83329.66	4250402	51	17.5	5.9	24.7	174.0	153.3	58.8	85.5	63.9
2	Amba	91479.05	2322835	25.39	1.15	8.89	13.47	23.85	24.98	15.28	1.79	1.64
3	Kundalika	85836.26	386465	4.50	0.63	2.03	4.81	34.38	30.42	23.78	3.90	6.70
4	Mhasala	66688.04	146250	2.19	0.66	2.32	6.49	46.71	46.72	37.43	11.28	11.60
5	Savitri	213628.70	451997	2.12	0.19	0.70	9.61	8.86	2.78	2.78	1.60	3.74

Source: Integrated Plan water resource department, District socio-economic abstract 2023

Patalganga river basin is densely populated basin which is dominated by cultivable area and forest, indicating high agricultural development. Amba river basin is Moderate density basin which indicates balanced forest and fallow land, representing semi-agricultural landscape. Kundalika river basin is Low population with forest dominance, showing natural land cover. Mhasala river basin shows sparse population but high cultivable area, mainly agricultural basin. Savitri river basin shows very low density shows higher fallow and waste land, indicating underutilized land.

Fig- 1

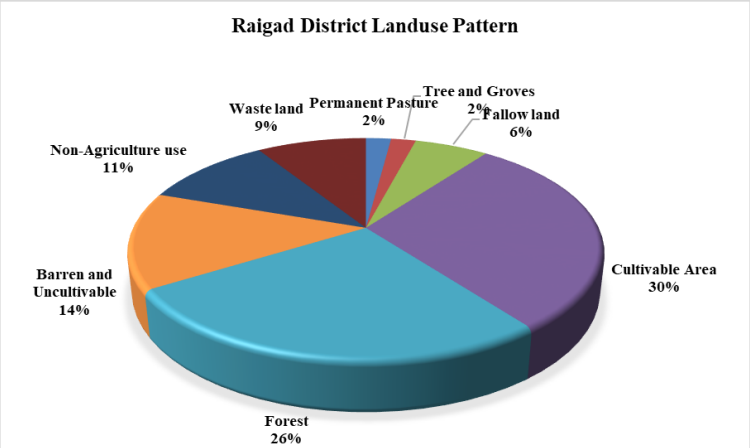


Table No.2

Population, land use and cropping intensity and rainfall

	Total Geographical Area	Density per sq.km	Cultivable Area	Cropping Intensity	Irrigated Area (ha)	Rainfall (mm)
mean	108192.3	17.04	57.56	125.7963	120554.9	3176.626
std	59658.85	21.35055	66.5608	11.05339	47558.02	247.857
min	66688.04	2.12	8.86	112.9671	82000.22	3030.2
25%	83329.66	2.19	23.85	115.9674	89748.51	3035.65
50%	85836.26	4.5	34.38	128.5086	90335.75	3070.78
75%	91479.05	25.39	46.71	132.5103	151106.2	3132.53
max	213628.7	51	174	139.0281	189583.8	3613.97

Table No.3
Statistical Result of geographical variables

Sr. No	River Basin	Total Geographical Area	Density Per sq.Km	Cultivable Area	Cropping Intensity	Irrigated area ha	Rainfall in mm
1	Patalganga	83329.66	51	174.0	112.96	151106.23	3070.78
2	Amba	91479.05	25.39	23.85	139.02	89748.51	3035.65
3	Kundalika	85836.26	4.50	34.38	132.51	90335.75	3132.53
4	Mhasala	66688.04	2.19	46.71	115.96	82000.22	3030.2
5	Savitri	213628.70	2.12	8.86	128.50	189583.76	3613.97

The fowling relation is noticed form statistical base.

1. No simple linear link between population density and cropping intensity. Patalganga has the highest population density but a below-average cropping intensity, while Amba (lower density) has the highest cropping intensity. This indicates population pressure alone does not determine cropping intensity; land availability, irrigation, cropping systems, and market orientation modulate the relationship.

2. Irrigated area and rainfall are important but not sufficient to explain Cropping intensity differences. Savitri has both high rainfall and the largest irrigated area and shows above-average cropping intensity. This aligns with expectations that water availability supports multiple cropping. However, Patalganga also has high irrigation but lower cropping intensity, which suggests other factors (crop types, land fragmentation, urban uses) can determines.

3. Cultivable area and cropping intensity show an inverse pattern in some basins. Amba and Savitri have small cultivable areas but high cropping intensity, consistent with intensive use of small arable land. Large cultivable area (Patalganga) does not automatically mean higher cropping intensity; larger arable tracts may be used with lower cropping frequency.

4. Conclusion

Cropping intensity is influenced by multiple interacting factors rather than any single variable. Population density does not exhibit a direct relationship with cropping intensity, as seen in Patalganga and Amba basins. Similarly, while water availability through rainfall and irrigation generally supports higher cropping intensity, it is not the sole determinant. Inverse trend between cultivable area and cropping intensity noticed in some basins. Smaller arable lands are often used more intensively, whereas basins with extensive cultivable areas may not necessarily practice frequent cropping. Overall, cropping intensity is shaped by a complex interplay of land availability, irrigation, rainfall, crop systems, and socio-economic factors, rather than any single geographical or demographic variable.

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