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MEASUREMENT OF LAND POTENTIALITY: A GEOGRAPHICAL ANALYSIS OF SOLAPUR DISTRICT

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Abstract:

Natural resources we mean any product, thing or circumstance found by man in his natural environment that he may in some way utilize for his own benefit. In this sense, the resources provides by nature include air, climate, land, water, plants, animals, mineral ores, oil, coal, natural gases. These natural resources play important role in the processes of rural development. Thus rural development is directly related to agriculture development. Food sufficiency, rural employment and economic, political and social discontent are directly related to agriculture sector in rural area. Therefore land is main natural resource for overall agriculture development. Thus attention here is made to analyze land resource and land potentiality in Solapur district. Agriculture density, nutritional density, economic density, caloric density, physiological density and intensity of population pressure these are the indicators of land potentiality. To determine Land Potentionality ***Shrivastavas S. L (1983)*** *method i.e. "Proportional Standardized Mean and Composite Index" has been utilized. With the help of composite index and indices value the spatial distribution of land potentionality is analysed.*

Key words: Development, land Potentionality.

Introduction:

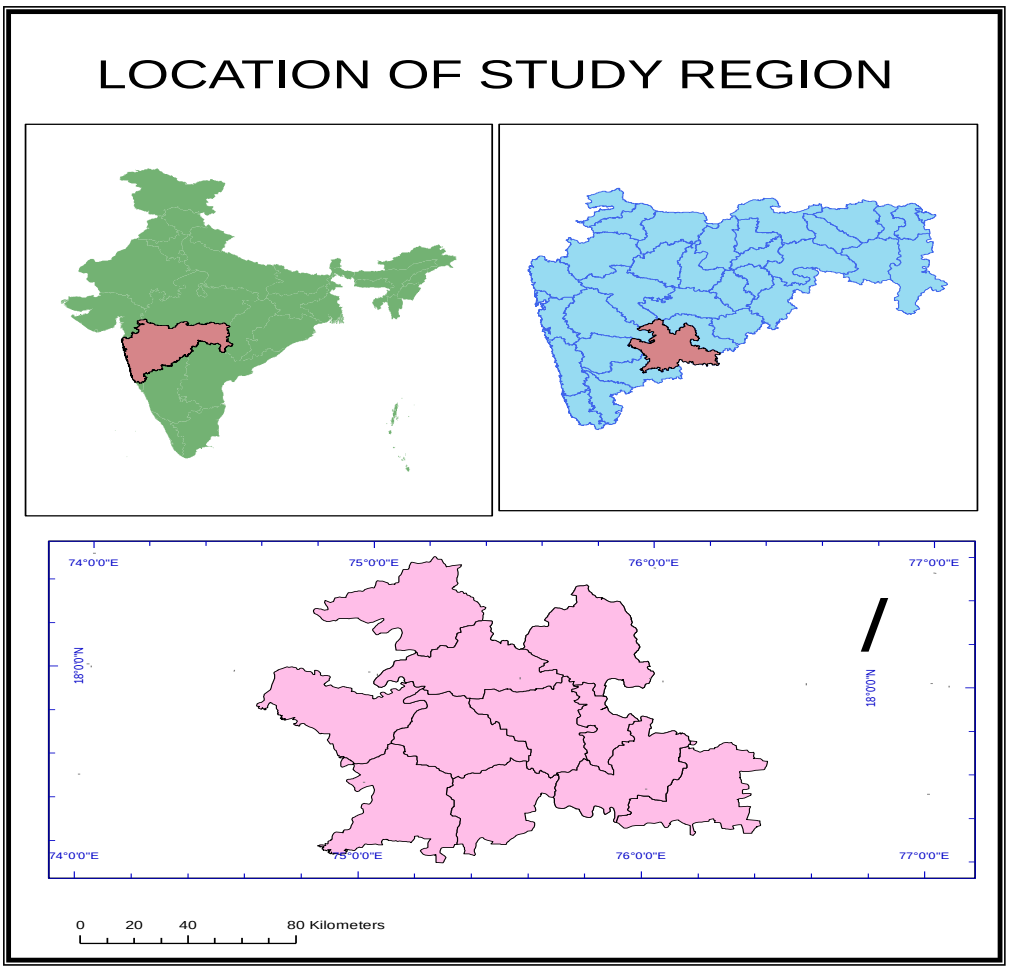
Natural resources play very important role in the process of rural development. Mother Nature provides us natural resources free of cost. Natural resources we mean any product, things or circumstances found by man in his natural environment that he may in some way utilize for his own benefit. In this sense the resources provided by nature include land, air, climate, soil, water, plant, animals, minerals and power resources, natural gas and solar radiation. (Katar Sing.(2009) Agriculture activity are the way of life in rural sector or society. Thus rural development is directly related to agriculture development. Food sufficiency, rural employment and economic, political and social discontent are directly related to agriculture sector. (P.K. Roy (2003) Therefore land is main natural resource for overall agriculture deleopment. Thus attention here is made to analyse land

resource and land potentiality in Solapur district.

Study Region:

The Solapur District area under Study lies entirely in the Bhima basin of Krishna river system. The district is bounded by 17^0 10' North to 18^0 32' North latitudes and 74^0 42' East to 76^0 15' East longitudes. The North South stretch of the district is 150 km and east-west extension is 200 km. The adjoining districts are Sangli to its South-West, Satara to its West, Pune to its North-West, Ahmednagar to its North and Osmanabad to its East and Bijapur district in Karnataka to the South.

Map No.1 Location of Study region:



The district has a total geographical area of 14878 sq km. It constitutes 20 percent of the total area of Pune division, 5 percent of the state Maharshtra. For administrative purpose, the district is divided into eleven talukas, which constitute 1150 villages and 10 urban areas. These talukas are North Solapur, Barshi, Akkalkot, South Solapur, Mohol, Mangalvedha, Pandharpur, Sangola, Malshiras, Madha and Karmala. The climate of district is hot and dry with 577 MM average annual rainfall and mean monthly maximum temperature ranging in between 32.8^{o}c and 41.28^{o}c while mean monthly minimum temperature ranging in between 13.94^{o}c and 24.2^{o}c.the district is drained by Bhima River.

Objectives:

Present Research paper incorporate following objectives:

1) To examine the indicators of Land Potentionality in Study region.
2) To analyze the spatial distribution of Land Potentionality in Solapur district.

Data Collection and Methodology:

To fulfil above objective the data regarding to six indicators of Land Potentionality i.e. Agricultural Density, Nutritional Density, Economic Density, Caloric Density, Physiological Density and Intensity of Population Pressure are collected from secondary source i.e. Socio-economic Review and District Statistical Abstract of Solapur District-2011. After the collection data is processed by using following method.

$$\text{Agriculture Density} = \frac{\text{Total Agriculture Population}}{\textit{Total Cultivated Area}} \text{ x } 100$$

$$\text{Nutritional Density} = \frac{\text{Total Rural Population}}{\textit{Total Crouped Area}} \text{ x } 100$$

$$\text{Economic Density} = \frac{\text{Total Rural Population}}{\textit{Total Net Sown Area}} \text{ x } 100$$

$$\text{Caloric Density} = \frac{\text{Total Rural Population}}{\textit{Total Area Under Food Crops}} \text{ x } 100$$

$$\text{Physiological Density} = \frac{\text{Total Population}}{\textit{Total Net Cultivated Area}} \text{ x } 100$$

$$\text{Intensity of Population Pressure} = \frac{\text{Caloric Density}}{\textit{Optimum Carrying Capasity}} \text{ x } 100$$

To determine Land Potentionality **Shrivastavas S. L (1983)** method i.e. "Proportional Standardized Mean and Composite Index" has been utilized. This is as following.

Where,

W= Weight of one particular indicator

Mean= the average of the series of one particular indicator.

SD = the standard deviation of same series.

$$Ci = \frac{x1w1 + x2\,w2 + x3\,w3 \text{ – – – – – –}}{w1 + w2 + w3 \text{ – – – – – – – – – – –}}$$

Where,

CI = Composite Index

X = Particular Indicator

W= Weight of series of one particular Indicator

Depending upon the composite index the indices have also calculated by taking whole region as 100 (for average composite index) by using following formula.

$$\text{Indices} = \frac{\text{Composite Index of Any Unit}x}{\text{Average Composite Index}} \text{ x } 100$$

Then on the basis of mean and standard deviation of composite index of tahsils of Solapur district are divided in to low, moderate, high and very high development. On the basis of these statistical technique results and conclusions are drown.

Indicators of Land Potentionality in Study Region:

Following indicators are taken into consideration as land potentionality in Study region. These are as follow

1. Agriculture Density in Solapur District:

Agriculture density is the number of agriculture people per unit of cultivated land. Agriculture density means the ratio between agriculture population and cultivated land. (B.N. Ghosh, 1996) District as a whole has 78.24 agriculture density. But the spatial distribution is varies from tahsil to tahsil. High agriculture density i.e. > 94.40 is found in Pandharpur and Malshiras tahsil. Due to Bhima irrigation projection and Bhima Sina joint cannel leads high surface irrigation which resulted high agriculture density. It is moderate ranging from 79.88 to 94.40 is found in Madha, Mohol and Sangola tahsil. While it is low in Karmala, Barshi, North Solapur, Mangalwedha, South Solapur and Akkalkot tahsil i.e. < 79.88 density per 100 hectare agriculture land. Karamala and Barshi due to undulating surface, North Solapur due high urbanization and remaining Mangalwedha, South Solapure and Akkalkot due to low irrigation leads low agriculture density.

2. Nutritional Density in Solapur District:

It is also known as Physiological Density. Nutritional density omits the unproductive land from consideration. The number of person behind per square kilometer cultivable land.

Table No-1.1 Indicators of Land Potentionality in Solapur District (2011):

Sr No	Tahsil	Agriulture Density	Nutritional Density	Economic Density	Caloric Density	Man Soil Density	Intensity of Population Pressure
1	Karmala	70.31	190.35	195.13	227.28	209.44	323.27
2	Madha	82.94	263.09	277.54	309.52	282.69	373.18
3	Barshi	71.58	200.29	206.28	245.49	293.91	342.97
4	N. Solapur	45.60	188.19	208.85	229.72	1880.81	503.80
5	Mohol	88.51	293.45	304.00	345.15	293.45	389.97
6	Pandharpur	108.91	317.57	323.15	398.15	409.04	365.57
7	Malshiras	95.78	428.70	447.05	582.02	494.24	607.68
8	Sangole	79.12	428.34	448.16	564.81	479.29	713.89
9	Mangalvedhe	67.12	260.05	274.19	365.53	290.87	544.55
10	S.Solapur	70.36	273.12	284.91	322.76	273.12	458.76
11	Akkalkot	65.36	264.16	276.30	334.37	331.20	511.61
	Total	78.54	278.34	289.99	345.45	411.77	439.85
	Mean	76.87	282.48	295.05	356.80	476.19	466.84
	SD	16.97	83.33	85.97	120.47	474.30	122.98
	Weight	4.529	3.390	3.432	2.962	1.004	3.796
	Total Weight	19.113					

Complied by Researcher on the basis of Socio-economic Review and District Statistical Abstract of Solapur District-2011

It is the ratio of cultivated land to total population. According to 2011 census district as a whole has 278.34 nutritional density. But the spatial distribution is varies from tahsil to tahsil. Tabel 1.1 reveals that, High nutritional density i.e. > 348.53 is recorded in Malsiras and Sangola tahsil. In Malshiras it is high due to the development of surface irrigation through Bhima-Sina joint canel, while in Sangola it is high due to Man river basin and development of drip irrigation. It is moderate ranging from 268.36 to 348.53 is found in Mohol, Pandharpur and South Solapur tahsil. While it is low i.e. < 268.36 is found in Karmala, Madha, Barshi, North Solapur, Mangalwedah and Akkalkot tahsil due to low agriculture density.

3. Economic Density in Solapur District:

It is a ratio in between rural population and net sown area. The number of rural population behind per 100 hectare net sown area. Table 1.1 reveals the district as a whole has 289.99 economic densities in 2011, but the spatial distribution is varies from tahsil to tahsil. High economic density i.e. > 359.93 is found in Malshiras and Sangola due to agriculture development. It is moderate ranging from 279.43 to 359.93 is recorded in Mohol, Pandharpur and South Solapur. While it is low i.e. < 279.43 is found in Karmala, Madha, Barshi, North Solapur, Mangalwedha and Akkalkot tahsil due to same reason which have mention earlier.

4. Caloric Density in Solapur District:

Number of rural people per 100 hectare area under food crops known as caloric density. It is ratio in between area under food crops and rural population. District as a whole has 345.45 caloric density per 100 hectare land. But the spatial distribution is varies from tahsil to tahsil. High caloric density is recorded in Malshiras and Sangola tahsil i.e. > 463.76 per 100 hectare land. In Malshiras due to the development of surface irrigation leads high agriculture production. In Sangola due to Man river leads drip irrigation which resulted in fruit farming. The caloric density is moderate ranging from 345.52 to 463.76 is found in Mohol, Pandharpur and Mangalwedha tahsil. While it is low i.e. < 345.52 is found in Karmala, Madha, Barshi, North Solapur, South Solapur and Akkalkot tahsil. Due to undulating surface in North western part of Karmala, Nothern part of Barshi, North Solapur due to the location of district head quarter leads high urbanization, South Solapur and Akkalkot due to lower development of surface irrigation leads low caloric density.

5. Man-Soil Density or Physiological Density:

It is ratio in between population and cultivated land. Number of agriculture working population per 100 hectare cultivated land known as physiological density. The table 1.1 indicates that district as a whole has 411.77 physiological density, but the spatial distribution is varies from tahsil to tahsil. High man-soil density i.e. >399.30 is recorded in North Solapur, Pandharpur, Malshiras and Sangola tahsil. It is high in North Solapur due to high urbanization, in Pandharpur

and Malshiras it is high due to the development of surface irrigation and fertile soil. While in Sangola it is high due to irrigation and fruit farming. It is moderate ranging in between 304.37 to 399.30 is found in Akkalkot tahsil. While it is low i.e. < 304.37 is found in Karmala, Madha, Barshi, Mohol, Mangalwedha and South Solapur tahsil.

6. Intensity of Population Pressure:

Intensity of population pressure is calculated the caloric density divided by Optimum carrying capacity in to hundred. It shows intensity of population pressure on agriculture land. District as a whole has 439.85 population per 100 hectare agriculture land. But the spatial distribution is varies from tahsil to tahsil. The table 1.1 indicates that high population pressure intensity i.e. > 583.67 is found in Malshiras and Sangola tahsil. Due to high development of surface irrigation of Bhima-Sina cannel and fertile soil leads agriculture development. In Sangola it is high due to Man River basin leads drip irrigation. It is moderate ranging in between 453.47 to 583.67 is observed in North Solapur, Mangalwedha, South Solapur and Akkalkot tahsil. While it is low i.e. < 453.47 is recorded in Karmala, Madha, Barshi, Mohol, and Pandharpur tahsil. Karmala and Barshi the population pressure is low due to its periphery location. In Pandharpur tahsil it is low due to high fertile soil in Bhima basin leads high cultivated land.

Spatial Distribution of Land Potentionality in Solapur District:

The table number 2 indicates composite index and indices value of each tahsil. The indices value of all tahsil ranging from mean minus one standard deviation to above mean plus one standard deviation. Therefore all the tahsil are grouped into following four groups.Then on the basis of mean and standard deviation of composite index of tahsils of Solapur district are divided in to low, moderate, high and very high development. On the basis of these statistical technique results and conclusions are drown.

Table No-1.2 Composite Index of Land Potentionality in Solapur District:

Sr No	Tahsil	Composite Index	Indices Value
1	Karmala	195.89	66.56
2	Madha	253.08	85.99
3	Barshi	211.12	71.73
4	Solapur North	316.14	107.41
5	Mohol	273.96	93.08
6	Pandharpur	295.95	100.55
7	Malshiras	415.85	141.29
8	Sangole	429.68	145.99
9	Mangalvedhe	291.34	98.99
10	Solapur South	271.75	92.33
11	Akkalkot	282.78	96.08
	Average C.I.	294.32	100.00
	SD		24.72

Source: Compiled by researcher on the basis of table 1.1.

Very High Land Potentionality in Study Region: Tahsils which have above mean plus one standard deviation indices value i.e. > 75.28 are included in this category. Very high land potentionality is recorded in **Malshiras and Sangola** tahsil. It is very high in Malshiras tahsil due to Bhima-Sina Joint cannel leads high development of surface irrigation and fertile soil resulted very high agriculture development. While in Sangola it is very high due to Man river leads development of surface irrigation.

High Land Potentionality in Study Region: Tahsils which have mean to mean plus one standard deviation indices value i.e. ranging from 100.00 to 124.72 are included in this group. High land potentionality is found in **Pandharpur and North Solapur**. It is high in Pandharpur due to Bhima River the development of surface irrigation, fertile soil, development of agriculture co-operatives leads high agriculture productivity. While it is high in North Solapur due to the location of district head quarter lead high urbanization, high development of industries resulted high concentration of population.

Moderate Land Potentionality in Study Region: The tahsils which have mean minus one standard deviation indices value i.e. 75.28 to 100.00 are included in moderate region. Moderate land potentionality is found in Madha, Mohol, Mangalwedha, South Solapur and Akkalkot tahsil.

Low Land Potentionality in Study Region: Tahsils which have below mean minus one standard deviation indices value i.e. < 75.28 is found in **Karmala and Barshi**. Due to its periphery location and undulating surface in North Western part of Karmala and North Eastern part of Barshi leads low land potentionality.

Conclusion:

The forgoing analysis reveals that land potentionality is very high in Malshiras tahsil due to the development of surface irrigation leads high agriculture, Nutritional and Economic density. While in Sangola due to Man River the development of surface irrigation leads high agriculture, Economic, Nutritional, Caloric and Physiological density.

In Pandharpur tahsil land potentionality is high due to the development of surface irrigation and fertile soil leads high agriculture and physiological density. While it is high in North Solapur

due to the location of district head quarter, high urbanization and industrialization resulted high physiological density.

Low land potentionality in Karmala and Barshi due to its periphery location and undulating surface leads low agriculture, nutritional, economic and caloric density. It is low in Akkalkot tahsil due to lower development of surface irrigation leads low caloric, economic, nutritional and agriculture density.

Land potentionality is also low in Mangalwedha and South Solapur tahsil due lower development of surface irrigation leads low agriculture and nutritional density.

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