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CORRELATION IN BETWEEN IRRIGATED AREA AND DENSITY OF POPULATION IN KOLHAPUR DISTRICT

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ABSTRACT

Density of population is concerned with the ratio between the size of population and the area. The density of population is determined by physical as well as Socio-economic and political factors. Irrigation is important determinants of density and distribution of population in developing countries. Therefore attempt is made here to study impact of irrigated area on density of population. The paper is based on secondary data. To examine the impact of irrigated area on density of population the Pearson's Coefficient of Correlation technique has been utilized. The rate of change in dependent variable has been estimated with the help of 'b' coefficient. The study reveals that there is high positive correlation correlation between irrigated area and density of population in the Kolhapur district.

KEYWORDS :irrigated area, density of population, Correlation, Regression.

INTRODUCTION

Demko (1970) recognizes that the land and people constitute the two significant elements of an area and the ratio between these two is of fundamental interest to all scholars concerned with population analysis. The term density of population was used by Henry in 1837, while preparing railway map (Narke and Kore, 2010). Density of population is concerned with the ratio between the size of population and the area (Chandana, 2007). Population density is related to the number of people and the space occupied by them. According to 2001 census the density of population is defined as the population per square kilometer. The density of population is determined by physical as well as Socio-economic and political factors. Size and density of population are the fundamental issues and their

disparities are of prime concern to population geographers. The geographer's task is to explain this diversity in terms of physical, social, demographic, economic, political and historical factors as an inter-related influence (Clarke, 1976).

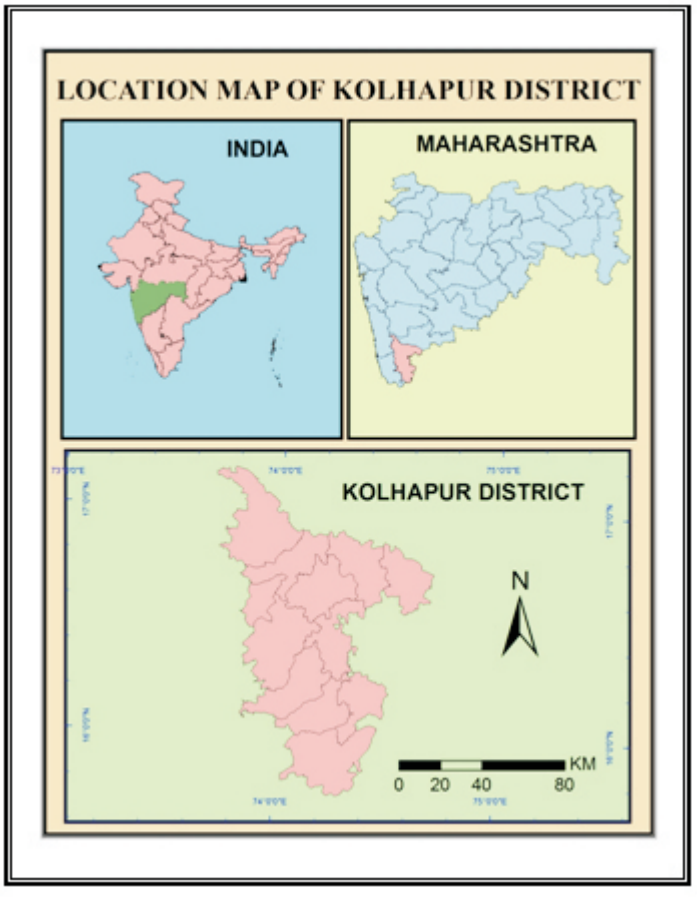
The analysis of population distribution and density holds immense significance for population Geographers, as its successful understanding holds the key to the analysis of entire demographic character of an area. The concept on density of population is most rarely and is a useful tool in the analysis of the diversity of man's distribution in space (Clarke, 1972). A study of the spatial aspects of population distribution is an important component of population geography studies of population distribution necessarily involve two sets of facts: a) facts about people and b) facts about the space they occupy (Ranade,1990). The study of density of population presents the integral relationship between population and land. It is important from various perspectives apart from demographic transition. The analytical study of the pattern and distribution of population plays an important role not only in evaluating the socio-economic condition of the country but also in facilitating for monitoring and introducing corrective measures for the future (Bisen and Jena, 2010).

Irrigation is important determinants of density and distribution of population in developing countries. Irrigation is the watering of land by artificial means to foster plant growth (Merrium Webster's Collegiate Dictionary, 2004, p.663). Irrigation means "A system of artificial watering of the land in order to grow crops" (Collins, 2006). Irrigation is the Supply of water to the land by means of channels, streams, and sprinklers in order to permit the growth of crops (Susan Maythew, 2004). Irrigation is identified as a decisive factor in Indian agriculture due to high variability and inadequacy of rainfall. Irrigation is imperative for successful agriculture particularly in the arid, semi arid and sub humid areas, which are prone to drought and famine conditions due to partial failure and delayed arrival or early withdrawal of Monsoon (Reddy & Reddy, 1992). Irrigation play important role as pull factor of migrating.

The labour requirements is high in irrigated area than rain fed area. As in irrigated area the intensity of agricultural operations are high. Irrigation method gives assure agriculture production. It promotes improved plant growth and productivity, larger yield, better crops are important benefits to the grower, therefore irrigation attract agricultural labours in the developing countries. irrigation positively affects on in-migration, so it can be hypothised that higher the irrigated area more is the density of population, therefore attempt is made here to study impact of irrigated area on density of population.

2.0 THE STUDY REGION:

Kolhapur district is the most developed district of Southern-western part of Maharashtra. The absolute location of district is 15°43' to 17°17' North Latitude and 73°40'and 74°42' East Longitude.



The Sahyadri ranges to the west and Warana River to the North forms the natural boundaries. The geographical area of districts 7685 square kilometers, for the administrative purpose the district is divided into 12 Tehsils. The population of the study region is 38, 76, 001 persons, according to 2011 census. The maximum and minimum temperature ranges in between 38oC and 14oC with annual average precipitation 115 cm.

3.0 OBJECTIVES:

The main objectives of this paper are as following.

1) To examine the impact of irrigated area on density of population in Kolhapur district

2) To estimate the rate of change in density of population in relation to irrigated area.

4.0 DATA COLLECTION AND METHODOLOGY

In order to meet these objectives the relevant information and data regarding irrigated area and sex ratio are collected and used for the year of 2011 are based on the Secondary Sources. The information and data was collected from census of Kolhapur district, 2011 and Socio Economic Review and District Statistical Abstracts of Kolhapur District, 2012.

Collected rough data are processed. To examine the impact of irrigated area on density of population the Pearson's Coefficient of Correlation technique has been utilized. The degree of relationship by considering percentage of irrigated area as an independent variable 'X' and density of population as dependent variable 'Y' is measured.

The functional form of linear relationship has been measured by using regression equation Y on

X i.e. y = a + bx. The rate of change in dependent variable has been estimated with the help of 'b' coefficient, which is the line of best fit. Analysis of the study has been made with help of the statistical techniques and on the basis of this results and conclusion are drawn.

5.0 RESULT AND DISCUSSION

Percentage of irrigated area and density of population:

The table-1 indicates that on an average the district as a whole has 9555.59 hectares irrigated area in 2011. The table also indicates that irrigated area of Tehsils of Kolhapur district is ranging in between 2360.7 hectre and 24172.4. The high irrigated area is found in Karvir, and Shirol Tehshil i.e. >16902 hectares due to Panghganga and Varna river. The moderate irrigated area rate is recorded in Panhala, Hatkangle, and Kagal tehshils i.e. 9631 hectres to 16902 hectares, while it is low in Shahuwadi, Radhanagri, Bhudargad, Ajra, Gadhinglaj, Chandgad and Bavda i.e. below 9631 hectres because these Tehsils are situated in hilly area of Sahyadri ranges, resulted into lower irrigation development.

Table-1 Irrigated area and density of population in Kolhapur District (2011)

Sr. No	Tehsils	Irrigated are in hectares	Density of population/sqkm
1	Shahuwadi	4073.9	178
2	Panhala	9935.8	456
3	Hatkanangale	15745.4	1315
4	Shirol	24172.4	777
5	Karvir	20743.3	1549
6	Bavda	2360.7	127
7	Radhanagari	7049.6	224
8	Kagal	10946.4	503
9	Bhudargad	4265.3	234
10	Ajra	3386.6	219
11	Gadhinglal	6415.8	469
12	Chandgad	5571.9	197
	Dist average	9555.59	520.63
	R =		+0.83004
	r^2 =		0.689

Source: Census of Kolhapur District 2011,Socio Economic review and District Statistical Abstract of Kolhapur District 2012.

The district as a whole has 521 density of population during the 2011, but spatial distribution varies from tehsil to tehsil ranging from 127 to 1549 in the 2011. The highest density of population is found only in Karvir tehshil i.e. 1549because district head quarter is locted in this tehsil, high urbanization and high agricultural development followed by hatkangle 1315 due to industrial and agricultural development. The moderate density is recorded only in Shirol tehsil i.e. 777 per sqkm., it is low in Shahuwadi, Bhudargad, Gadhingalaj, Chandgad, Panhala, Bavada, Radhnagar and Kagal Tehsils i.e. below 601. On an average it is observed the Tehsils those have high irrigated are having high density of population but there are some exceptions that have high irrigated area and low density of population.

In the context of objective the following findings have come to light.

1) The high positve correlation between the irrigated area (X) and density of population (Y) has been observed in the Tehsils of Kolhapur district. The coefficient of correlation in this regard is at r = +0.83004. It indicates that a good positive relationship between the variables 'X' and 'Y'. The degree of linear association between these two variables obtained by using the coefficient of determination (r2) is found to be at 0.689, which reveals that the independent variable (X) i.e, the irrigated area are explaining 68.9 percent of the total variations in dependent variable (Y) i.e. density of population in the Tehsils of Kolhapur district. It is a good explanation because 68.9 percent of the variations in (Y) density of population to be influenced by the variable (X) i.e. irrigated area and about 31.1 per cent of the variation is left to be influenced by other variables i.e. development of industry, educational institutes, trade and tourism.

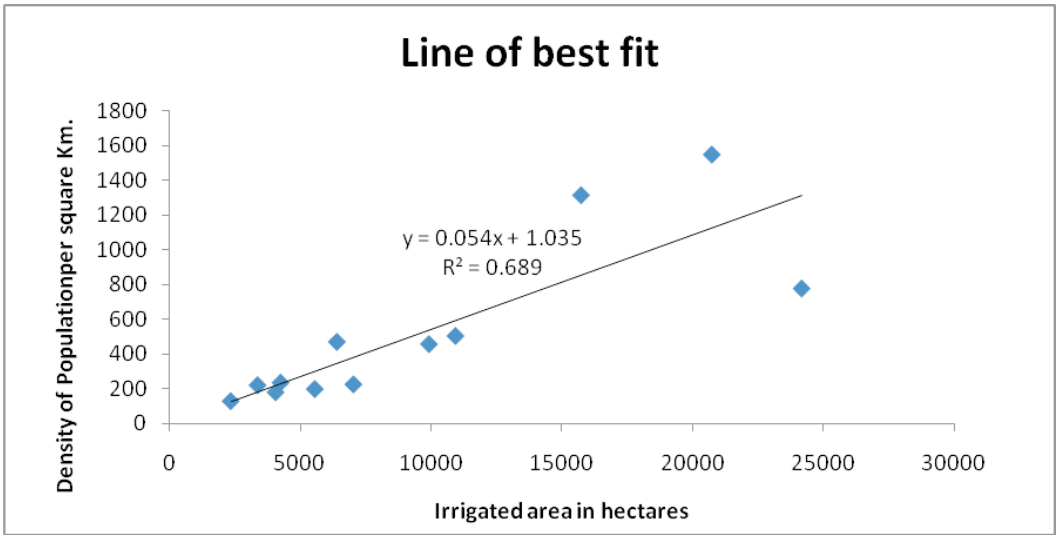


Figure-2

2) The functional form of linear relationship computed through the regression equation of Y on X found to be at Y = 1.035 + 0.054x. The line of best fit is shown in the figure-2. The regression coefficient indicates that increase of one hectare irrigated area causes for increase of density of population by 0.054 per square kilometer. By testing the significance of regression coefficient (a test of significance), the validity of this causal relationship has been confirmed,

The equation used $t = (b-\beta)\sqrt{n(-2)\ \Sigma X(i-\bar{X})^2 \div \Sigma Y(i-yi)^2}$

The calculated value of 't' in this exercise is found at 4.67. It is observed that this calculated value is higher than the tabulated value of 't' (3.17) at the 10 degree of freedom (df = n –2, where 'n' is 12) even at 1 per cent level of significance.

Table -2 Residuals from regression of density of population of Tehsils of Kolhapur district.

Sr. No	Tehsils	yi	Yi-yi
1	Shahuwadi	221.03	-43.03
2	Panhala	537.57	-81.57
3	Hatkanangale	851.29	463.71
4	Shirol	1306.34	-529.34
5	Karvir	1121.17	427.83
6	Bavda	128.51	-1.51
7	Radhanagari	381.71	-157.71
8	Kagal	592.14	-89.14
9	Bhudargad	231.36	2.64
10	Ajra	183.91	35.09
11	Gadhinglaj	347.49	121.51
12	Chandgad	301.92	-104.92

Source: Compiled by Researcher.

3) In order to understand the degree of fit of regression equation and the accuracy level of predicted values (y) for the density of population of Tehsils of Kolhapur district the standard error (SE) of estimate is being done with the equation SE (Y) = SY $\sqrt{1}$ r2, where SE (Y) is the standard deviation of residuals (Y-y); and 'SY' is the standard deviation of 'Y'.

The confidence interval of the predicted values are worked out at Y = Y ± SE (Y) (The SE (Y) for the present exercise is 260.48 and SY is the 467.065). Thus it is assumed that if the values of 'Y' (Y-y) lie within the range of Zero to ± SE, the prediction could be expected to be accurate. In other words, the role of independent variables in explaining the change in dependent variable can be accepted as correct. In this context it has been observed that the predicted values (given in table- 2) of 11 out of 12 Tehsils in the present study lie within the range of zero to ± SE, and 1 within ± SE to ± 2 SE. Now the obvious inference is that the 91.66 per cent of the total number of observation (n is 12) the regression is a good indicator meaning thereby that the variations of density of population in Tehsils of Kolhapur district is the function of the variations in irrigated area. In the case of other tehsil with residuals between > ± SE to ± 2 SE the situation is different because here the regression is a poor indicator. It clearly indicates that these are the Tehsils whom the influence of variables other than the independent one. The variations of density of population of tehsil in the latter case may be due to the variation industrial development, Variation in development of educational, transportation and tourism facilities.

6.0 CONCLUSIONS:

The study reveals that there is high positive correlation between irrigated area and density of population in Tehsils of kolapur district. The coefficient of determination reveals that the independent variable (X) i.e, the irrigated area are explaining 68.9 per cent of the total variations in dependent variable (Y) i.e. density of population of Tehsils of Kolhapur district. It is a good explanation because 68.9 per cent of the variations in (Y) density of population to be influenced by the variable (X) irrigated area and about 31.1 percent of the variation is left to be influenced by other variables i.e industrial, educational, trade and tourism development. The irrigated area is found to be more effective than the other variables considering density of population. It is found that increase of one hectare irrigated area

causes for increase of 0.054 density of population in Tehsils of Kolhapur district. Therefore it is to be stated that the irrigation play very important role in population concentration.

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