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The Study of Spatio-Temporal Distribution and Density of Population in Solapur District: A Geographical Analysis

Dr. Konade Bhairappa Naganna

Abstract:

Population distribution and density are important indicators for understanding the spatial characteristics and regional variations of population. The present study examines the spatio-temporal distribution and density of population in Solapur District of Maharashtra during the period 1991 to 2011. The main objectives of the study are to examine the spatial distribution of population and analyse the changes in population density during the study period. The analysis indicates that the population of Solapur District increased from 32,31,057 in 1991 to 43,17,756 in 2011, showing an increase of 10,86,699 persons.

Population density also increased from 217.66 persons per sq. km. in 1991 to 290.86 persons per sq. km. in 2011, an increase of 73.21 persons per sq. km. North Solapur recorded the highest population and density in both years, mainly due to urbanisation and concentration of administrative, commercial, industrial, educational and service activities. Pandharpur and Malshiras also recorded relatively high density, whereas Karmala, Mohol and Mangalwedha remained comparatively low-density areas. The study reveals that population distribution in Solapur District is spatially uneven and is influenced by urbanisation, agricultural development, irrigation, employment opportunities, transport, industries and availability of services. The findings provide useful insights for regional planning, infrastructure development and balanced socio-economic development of the district.

Keywords: *Population Distribution, Population Density, Spatio-Temporal Analysis, Regional Development.*

Introduction:

Population characteristics refer to the various demographic, social, economic and cultural features of a population. These characteristics help us understand the size, composition, distribution and quality of the population in a particular region. Important population characteristics include population size, density, growth rate, age structure, sex ratio, child sex ratio, literacy, fertility, mortality, migration, occupational structure and rural-urban composition. These characteristics differ from one region to another due to variations in physical, economic, social and cultural conditions (Nangare M.R. 2021).

Population distribution refers to the spatial pattern of people living in a particular geographical area, while population density indicates the number of people living per unit area, usually per square kilometer. The study of population distribution and density is important for understanding the spatial pattern of population and the relationship between population and available resources. Population distribution and density are important for regional planning and development**.** The study also helps in understanding the influence of relief, climate, soil, water availability, agriculture, industries, transport, urbanization and employment opportunities on population concentration. Therefore, population distribution and density provide an important basis for resource allocation, infrastructure development, regional planning, environmental management and balanced socio-economic development. Therefore, attempt is made to study the spatio-temporal distribution of population and density in the Solapur district.

Study Region:

For the present investigation Solapur district is selected as a study region. Solapur district is located in the south-eastern part of Maharashtra and forms part of the Deccan Plateau. Geographically Solapur district is located between $17^{0}10'$ North to $18^{0}32'$ North latitude and $74^{0}42'$ East to $76^{0}15'$ East longitude. It covers an area of 14,895 sq. km. The shape of district resembles flying eagle. The major rivers influencing the physiography of the district are the Bhima, Sina, Man and Bor**.** The Bhima River is the most important river.

The proportion of area of Solapur district as compare to Maharashtra is about five (5%) per cent. It is administratively sub-divided into 11 tahsils. The soils of the district can be classified into three main types. These are black soil, coarse grey soil and reddish soil. Agro-climatically, the entire district comes under the rain shadow area. Rainfall is uncertain and scanty. The average rainfall for the district is 545.4 mm.

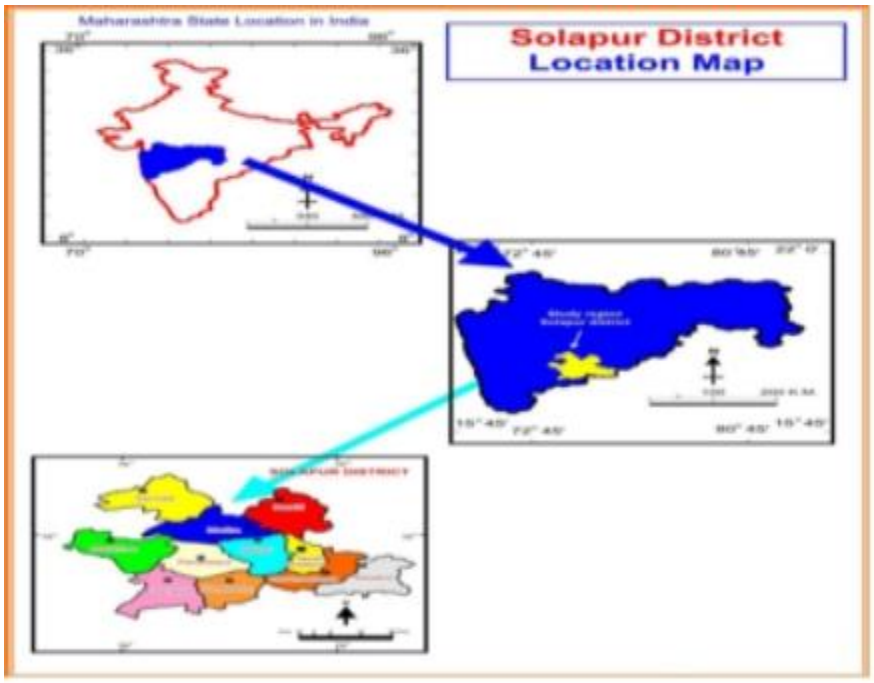

Figure No. 01

Objective:

The main objectives of this paper are as following.

1. To study the spatio temporal distribution of population in Solapur District.
2. To study the spatio temporal changes in density of population in Solapur District.

Database and Methodology:

The study was conducted in Solapur district of Maharashtra state. For the purpose of the study, only secondary information was collected from different sources. Data regarded distribution and density of population and geographical information collected through Census of Solapur district, District statistical Department of Solapur and socio-economic abstract of Solapur district in 1990-91 and 2010-11.

Result and Discussion:

Solapur district is one of the important districts of Maharashtra and has a large and diverse population. According to the 2011 Census**,** the total population of Solapur district was approximately 43.17 lakh**,** comprising about 22.23 lakh males and 20.94 lakh females. The population distribution helps identify areas of high, moderate and low population concentration and explains regional differences caused by physical, economic and social factors. Following table no. 01 shows spatio-temporal distribution of population and density in the Solapur district.

Table No.1
Spatio-Temporal Distribution and Density of Population in Solapur District
(1991 to 2011)

Sr. No.	Tahsil	1991		2011		Changes	
		Population	Density	Population	Density	Population	Density
1	Akkalkot	2,62,872	189.08	3,14,570	226.26	51,698	37.18
2	Karmala	1,94,600	133.01	2,54,489	173.94	59,889	40.93
3	Barshi	3,02,158	187.71	3,72,711	231.54	70,553	43.83
4	Madha	2,50,176	219.28	3,24,027	284.01	73,851	64.73
5	Malshiras	3,50,346	230.16	4,85,645	319.04	1,35,299	88.88
6	Mangalwedha	1,48,893	105.72	2,05,932	146.22	57,039	40.50
7	Mohol	2,02,900	131.34	2,76,920	179.25	74,020	47.91
8	N. Solapur	7,84,361	1065.27	10,57,352	1436.03	2,72,991	370.76
9	Pandharpur	3,17,348	243.44	4,42,368	339.34	1,25,020	95.90
10	Sangola	2,30,246	192.63	3,22,845	270.10	92,599	77.47
11	S. Solapur	1,87,157	120.75	2,60,897	168.33	73,740	47.58
	District	32,31,057	217.66	43,17,756	290.86	10,86,699	73.21

Source: Compiled by Researcher on the basis of Census Hand Book of Solapur District and Socio-Economic review and district statically abstract of Solapur district 1991 and 2011.

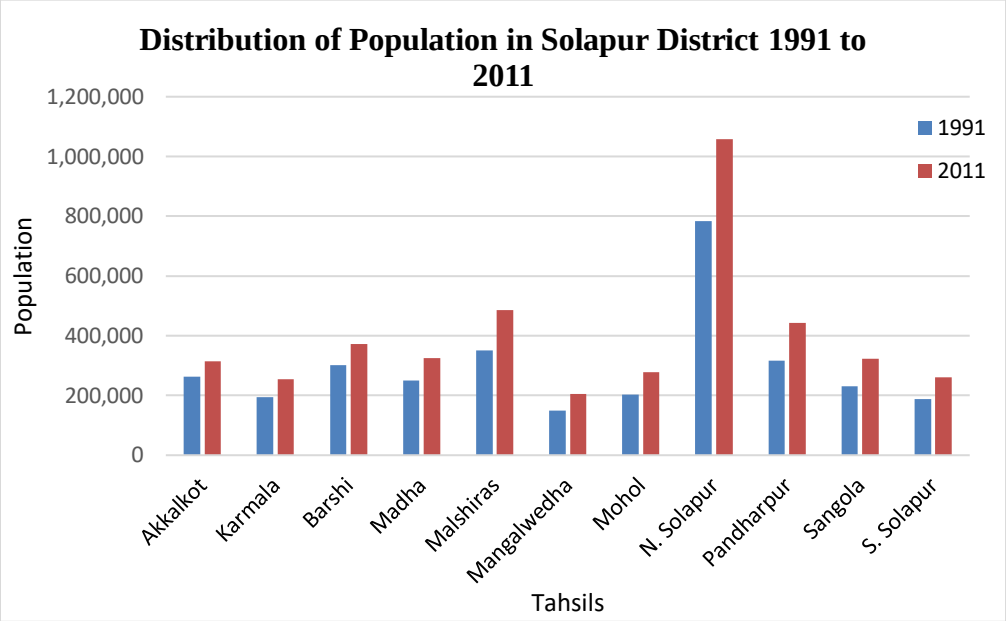

Fig. No. 02

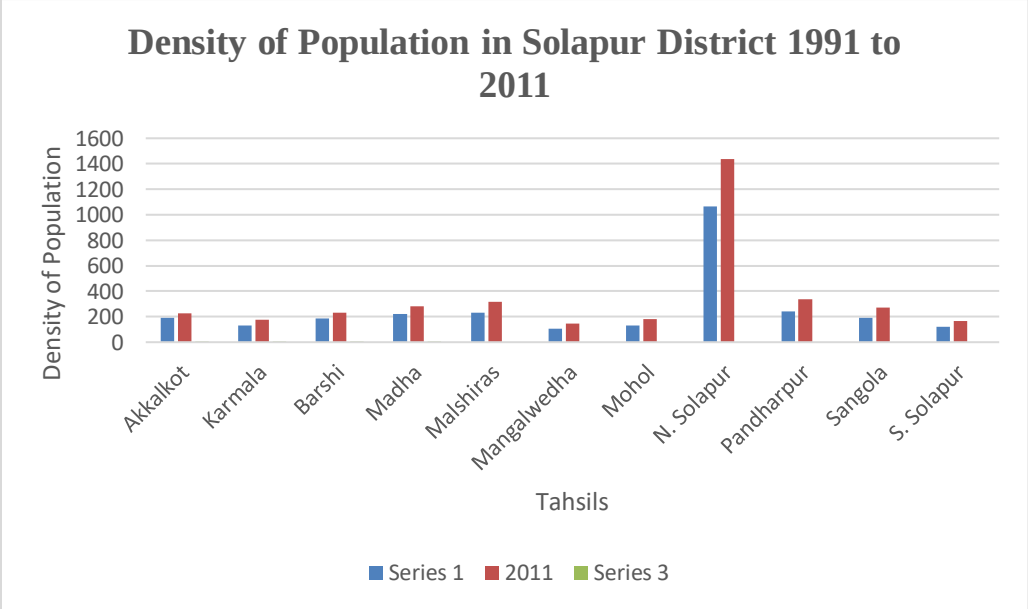

Fig. No. 03

In 1991, the total population of Solapur District was **32,31,057.** The distribution of population was highly uneven among the tahsils. North Solapur is high populated tehsil because mainly concentration of population in Solapur city and associated administrative, commercial, industrial, educational and service activities. After that **by** Malshiras, Pandharpur, Barshi **and** Akkalkot.

Table No. 01 and fig. no. 02 shows that, the population density of Solapur District was 217.66 persons per sq. km in 1991. The spatial distribution was highly uneven, with considerable variation among tahsil to tahsil. North Solapur recorded an exceptionally high density i.e. 1,065.27 persons per sq. km., mainly because of the concentration of population in Solapur city and associated administrative, commercial, industrial, educational and service activities. The tahsil Pandharpur (243.44) and Malshiras (230.16) also recorded relatively high densities. The higher density in these areas can be associated with urban growth, agricultural development, irrigation, employment opportunities and concentration of services.

The moderate density areas included Madha (219.28), Sangola (192.63), Barshi (187.71) and Akkalkot (189.08). These tahsils had a combination of agricultural and non-agricultural activities. Agricultural land, settlements, market centres and transport facilities supported population concentration, but the absence of a very large urban concentration kept their density below North Solapur. The low-density areas were Karmala (133.01), Mohol (131.34) and Mangalwedha (105.72). Their comparatively low density can be related to relatively dry climatic conditions, dependence on agriculture, limited irrigation in some areas and comparatively less concentration of urban and industrial activities. Thus, in 1991, population density was strongly influenced by urbanisation, irrigation, agricultural potential and employment opportunities.

Table no. 01 and fig. no. 03 also shows that, the population density of Solapur District was 290.86 persons per sq. km in 1991. In 2011, the population density of Solapur District increased considerably to 290.86 persons per sq. km.

compared with 217.66 persons per sq. km. in 1991. This indicates increasing population concentration and development during the period. North Solapur continued to have the highest density, reaching 1,436.03 persons per sq. km. The exceptionally high density was associated with the continuing expansion of Solapur urban area and concentration of employment, industries, educational institutions, health facilities, trade and administrative functions. Pandharpur (339.34) and Malshiras (319.04) also recorded high densities. Their high density was supported by urban growth, agricultural development, irrigation, sugarcane cultivation, commercial activities and employment opportunities.

The moderate density tahsils in 2011 included Madha (284.01), Sangola (270.10), Barshi (231.54) and Akkalkot (226.26). All these tahsils experienced an increase in density compared with 1991. The increase can be attributed to population growth, improvement in infrastructure, agricultural development, irrigation and expansion of market and service centres. Whereas the low density tahsils in 2011 remained Karmala (173.94), Mohol (179.25) and Mangalwedha (146.22). Although density increased in all three tahsils, they remained comparatively less densely populated. Their lower density is associated with relatively dry environmental conditions, agricultural dependence and lower levels of urban-industrial concentration compared with North Solapur, Pandharpur and Malshiras.

The table No 01 shows **a** general increase in population density in every tahsil of Solapur District between 1991 and 2011**.** District-level density increased from 217.66 persons/ sq. km in 1991 to 290.86 persons/ sq. km in 2011**,** representing an overall increase **of** 73.21 persons/ sq. km.

Conclusion and suggestion:

The study of spatio-temporal distribution and density of population in Solapur District reveals considerable spatial variation in population concentration during 1991–2011. The total population of the district increased from 32,31,057 in 1991 to 43,17,756 in 2011, representing an increase of 10,86,699 persons. During the same period, population density increased from 217.66 persons per sq. km. to 290.86 persons per sq. km., showing an overall increase of 73.21 persons per sq. km.

North Solapur emerged as the most densely populated tahsil in both 1991 and 2011. Its density increased from 1,065.27 to 1,436.03 persons per sq. km., reflecting the strong influence of Solapur city and its associated administrative, commercial, industrial, educational and service activities. Pandharpur and Malshiras also recorded high densities because of urban growth, agricultural development, irrigation, commercial activities and employment opportunities. Karmala, Mohol and Mangalwedha remained comparatively low-density areas because of relatively dry environmental conditions, agricultural dependence and lower levels of urban-industrial concentration.

An important finding is that population density increased in every tahsil between 1991 and 2011**.** However, the magnitude of increase differed considerably from one tahsil to another. Therefore, the population distribution of Solapur District remained spatially uneven. The study concludes that urbanization, irrigation, agricultural potential, industries, employment opportunities, transport facilities and social services played an important role in determining population distribution and density.

The empirical result suggested that, Development planning should focus on reducing the regional imbalance between highly populated urban areas and comparatively low-density rural tahsils. The Small-scale industries, agro-based industries and rural enterprises should be promoted in low-density tahsils to generate employment and reduce excessive dependence on agriculture.

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Conflicts of interest

The authors declare that there are no conflicts of interest regarding the publication of thesis paper.

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