CHAPTER - III

SPATIAL DISTRIBUTION OF CITIES

Geographers study the interaction between the man, resources and space. The pattern made by the distribution of population on the earth surface is something which is of fundamental relevance to almost any analysis of man and his activities. Geographers study the distributional phenomena. In the real world, the nature of demand and technology of production is constantly changing. The localization of resources and the levels of development distorts the uniform pattern of settlement distribution.

The spatial distribution means an occurrence which occupies the portion of the earth's surface where the distribution relates to spatial arrangement of occurrence. (Ambrose 1969).

NATURE OF DISTRIBUTION :

There are three type of distribtions, discrete, continuous and contingent. Discrete distribution is the result of an assemblege of different occurrences, continuous distribution is found when occurrences are dependent, a contingent distribution developes where the magnitude of distribution is related to either area of type. (Prasad 1974).

In this chapter an attempt has been made to study the spatial distribution of cities, their size their relationship with various factors of distribution and their spatial pattern.

FACTORS INFLUENCING URBAN GROWTH :

There are several factors responsible for the growth of urbanisation. The role of physical factors is more important in the location of urban settlement. However, the social and economic factor are also important in determining whether a particular place should grow, develop functions and become focy of the surrounding area (Deshmukh 1979).

Exchange of goods, developments of transport network and improvement of economic conditions also play important role in growth and rise of urban settlement. Inspite of all these factors the greatest impact on growth and development of urbanization was of industrialization, improvement of technology, development of agriculture and irrigation. The industrial development is the major cause affecting the distribution of urban settlement.

DISTRIBUTION OF CITIES :

The region under study is one of the progressive State of India where the highest degree of urbanization is found. In 1901 Maharashtra was having 16.59% urban population living in 219 urban places. Out of these only three urban places, Bombay, Nagpur and Pune were classified as Class I cities. Since then the number of towns goes on increasing and in 1951, Maharashtra was having 383 urban places in which 5 urban places Bombay, Pune, Nagpur, Solapur and Kolhapur were Class I cities. In the next decade the number of urban places decreases to 266. It happened so because of the

change in the (defination) of urban place. In 1961 the number
of towns shows decrease but the number of Class I cities
shows increase more than 140%. From 5 their number has in-
crease to 12. In the next census year (1971) total number
of towns increased to 289 and number of Class I cities
increased to 17 and in 1981 few urban places have declined
and number has decreased to 276 urban places. But number of
Class I cities have increased to 25 giving net increase of
8 Class I cities. (Table 3.1 and 3.2)

increased

T A B L E - 3.1

NUMBER OF TOWNS IN MAHARASHTRA
ACCORDING TO POPULATION SIZE
1901 - 1981

Class	1901	1911	1921	1931	1941	1951	1961	1971	1981
I	3	3	4	4	4	5	12	17	25
II	2	1	1	1	7	16	15	25	20
III	13	11	21	29	33	39	47	65	81
IV	60	50	45	57	69	84	89	98	91
V	116	111	113	119	122	196	88	70	43
VI	25	56	54	48	31	43	15	14	16
Total	219	232	236	258	266	383	266	289	276

T A B L E - 3.2

DECADEWISE PERCENTAGE SHARE OF URBAN POPULATION
1901 - 1981

Region	1901	1911	1921	1931	1941	1951	1961	1971	1981
Maharashtra State	16.59	15.13	18.50	18.60	21.11	28.85	28.22	31.17	35.03
India (Average)	10.85	10.29	11.18	12.00	13.86	17.30	17.98	19.87	23.73

The regional distribution of cities indicates that in Bombay division there are 7 districts of which two districts Raigad, and Ratnagiri do not possess Class I cities. Remaining five districts have a total of nine class I cities; of which there in Thane district, two each in Nasik and Jalgaon district; one in Dhulia district and entire Bombay district is an urban agglomaration. (Fig. 3.1)

In Pune division excepting Satara district, all five districts have Class I cities. Ahmednagar, Pune, Sangli and Solapur district have one Class I city each. Only Kolhapur district has two Class I cities.

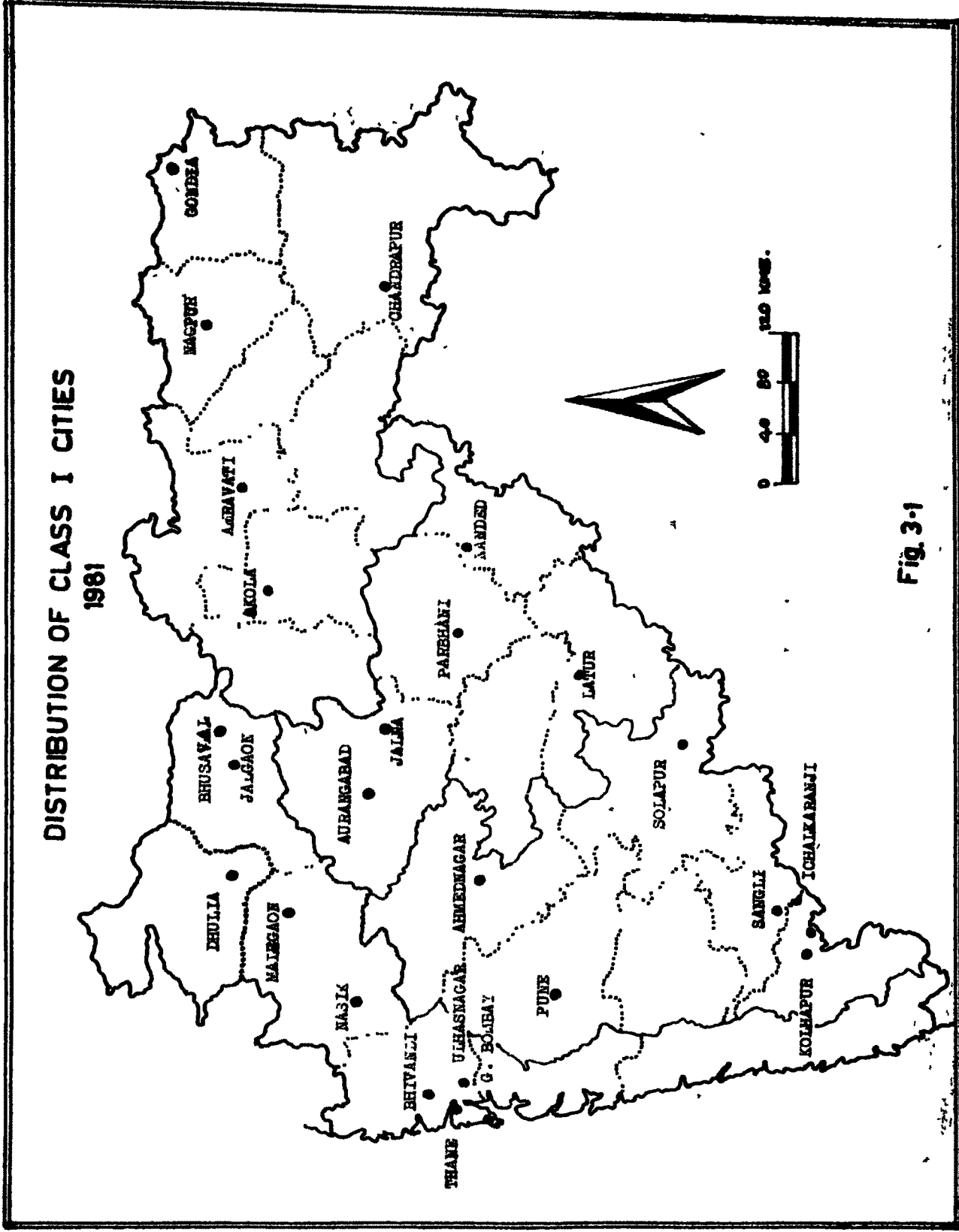Marathwada region has five Class I cities. Excepting Bhir remaining four districts have Class I cities.

In Vidarbha, Buldhana, Yeotmal and Wardha districts do not possess Class I city. Remaining five districts have one Class I city each. (See Table 3.3).

POPULATION SIZE CLASS OF CITIES :

In order to study the population size of class I cities, all Class I cities of Maharashtra have been classified in to five size class groups. They are :

    I)   Below 3 Lakh Population

    II) Cities with Population between 3 to 5 Lakh

   III) Cities with population between 5 to 10 lakh

    IV) Cities with population between 10 to 15 lakh

    V) Cities above 15 lakh.

DISTRIBUTION OF CLASS I CITIES
1981

GONDIA
NAGPUR
CHANDRAPUR
AMRAVATI
AKOLA
NANDED
PARBHANI
BHUSAVAL
JALGAON
AURANGABAD
JALNA
LATUR
DHULIA
MALEGAON
AHMEDNAGAR
SOLAPUR
NASIK
ULHASNAGAR
SANGLI
BHIVANDI
G. BOMBAY
PUNE
ICHALKARANJI
KOLHAPUR
THANE

0 40 80 120 KMS.

Fig. 3·1

T A B L E - 3.3

DISTRICTWISE - URBAN POPULATION, CLASS I CITY
POPULATION, % OF CLASS I CITY POPULATION TO
URBAN POPULATION OF DISTRICT AND NUMBER OF
CLASS I CITIES IN EACH DISTRICT - 1981.

Sr. No.	Districts	Urban Population of District	Class I city Population of Dist.	% of Class I city Population to urban popu. of District.	No.of Class I Town in District
1.	2.	3.	4.	5.	6.
1.	Gr. Bombay	8227332	8227332	100	1
2.	Thane	1482131	697859	47.08	3
3.	Kulaba	209895	-	-	-
4.	Ratnagiri	170923	-	-	-
5.	Nasik	927763	507788	54.73	2
6.	Dhule	400239	210927	52.70	1
7.	Jalgaon	658117	268381	40.78	2
8.	Ahmednagar	351933	143915	40.89	1
9.	Pune	1970039	1202848	61005	1
10.	Satara	266063	-	-	-
11.	Sangli	394036	152382	38.67	1
12.	Solapur	767264·	510707	66.56	1
13.	Kolhapur	621622	474014	76.28	2

1.	2.	3.	4.	5.	6.
14.	Aurangabad	537295	415461	77.32	2
15.	Parbhani	34332	109328	31.90	1
16.	Beed	229878	–	–	–
17.	Nanded	327289	190819	58.30	1
18.	Osmanabad	343448	111961	32.59	1
19.	Buldana	278981	–	–	–
20.	Akola	454645	215402	47.67	1
21.	Amravati	544447	261387	48.00	1
22.	Yeotmal	262137	–	–	–
23.	Wardha	231506	–	–	–
24.	Nagpur	1465132	1215415	82.95	1
25.	Bhandara	240653	100342	41.69	1
26.	Chandrapur	261403	115352	44.12	1
	Total	21966806	15041620		25

Out of the 25 Class I cities of Maharashtra; 19 cities (76 % of the total) are included in the first size class. They are Bhivandi, Ulhasnagar, Bhusaval, Nasik, Malegaon, Dhulia and Jalgaon from Bombay Division, Ahmednagar, Sangli and Ichalkaranji from Pune division; Aurangabad, Nanded, Jalana, Latur and Parbhani from Marathwada division and Akola Amravati, Chandrapur and Gondia from Vidarbha division.

Second size class (3 to 5 lakh) includes, Thane and Kolhapur cities of Maharashtra. Both these cities are the growing cities and there is every possibility that these two cities may join higher size class in near future.

The city of Solapur is the only city included in the third group. It is a old industrial city and trade centre of South Maharashtra.

The population size class with 10 to 15 lakh population includes two important growth centres of Maharashtra, namely Pune and Nagpur. Nagpur a second capital of Maharashtra and industrial township of Vidarbha; is a very important urban centre which commands large area and population. Pune the another an industrial city is an important cultural and education centre of Maharashtra. Nearness to Bombay has encouraged the growth of this city.

The last group includes only one city of Maharashtra. Bombay whose population is more than 8.2 million; Bombay an important growth pole of India and a capital of a state indicates its influences on almost all the area of Maharashtra.

CONCENTRATION OF URBAN POPULATION :

In order to study the concentration of urban population and the concentration of share of Class I city population Lorenz Curve has been prepared taking in to account the four administrative division of Maharashtra. The Fig.No. 3.2 indicates that out of the total urban population, 54.97% urban population is concentrated in Bombay division. At the same time out of the total population of Class I cities 65.89% population is found in Bombay division. It means Bombay division has a very high share of urban population and the Class I city population. Remaining three divisions have 45.03% and 34.11% share of urban and Class I city population respectively.

When Pune division is included, the area has 74.89% of total urban population. But out of the total class I city population it accounts for 81.74% population of Class I cities. Nagpur division has only 17% of urban population and 12.75% population of Class I cities. The Marathwada division has a very poor share of urban, as well as Class I city population. Table 3.4 gives the details of urban and Class I city population and their percentages for four administrative divisions of Maharashtra.
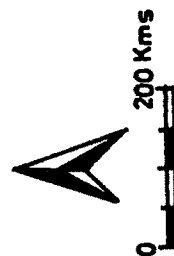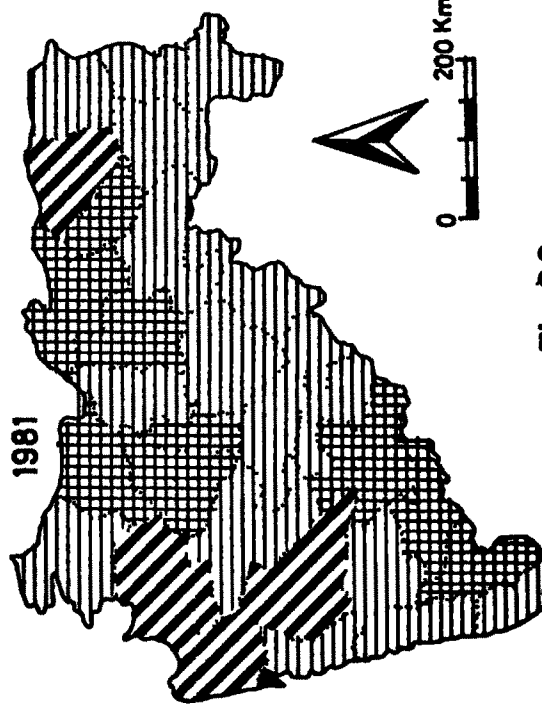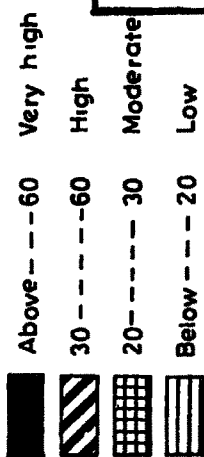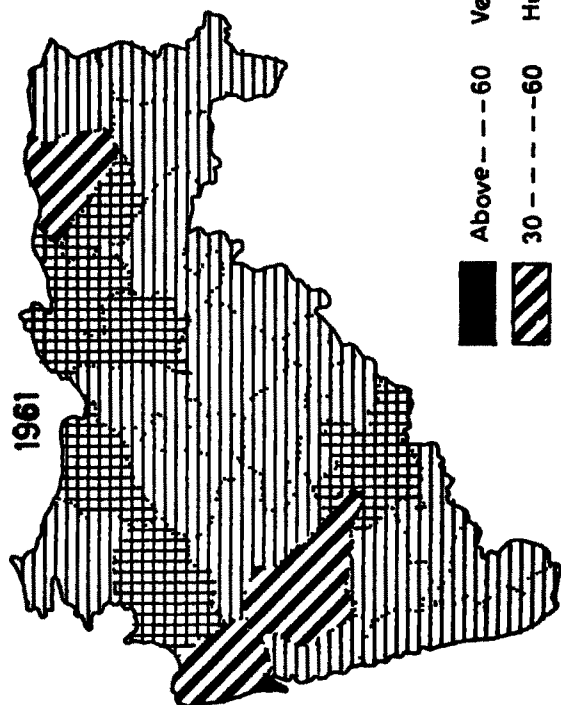
DEGREE OF URBANIZATION

1971

1961

1981

Concentration of urban population 1981

% Share of class I pop of division

% Share fo urban pop of each division

Fig.3·2

Above —— 60   Very high
30 ————— 60   High
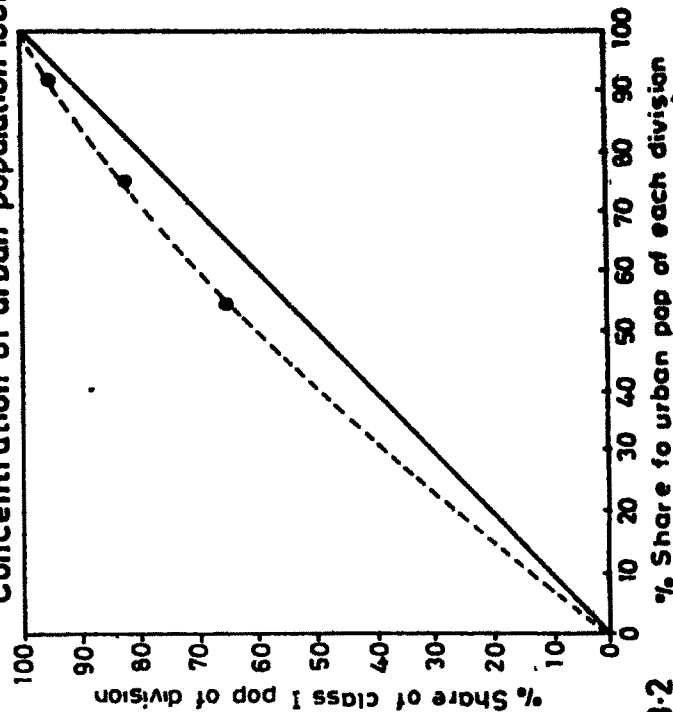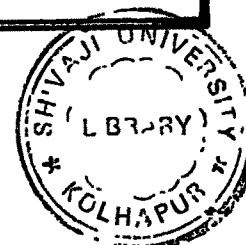20 ————— 30   Moderate
Below —— 20   Low

200 Kms

Fig. 3·3

T A B L E - 3.4

DIVISIONWISE - URBAN POPULATION AND CLASS
I CITY POPULATION - 1981.

Division	Urban Population (In Lakh)	Percentage	Cumulative Percentage	Class I City Population (In Lakh)	Percentage	Cumulative Percentage.
Bombay	120.76	54.97	54.97	99.12	65.89	65.87
Pune	43.71	19.92	74.89	23.84	15.85	81.74
Vidarbha	37.39	17.00	91.89	19.18	12.75	94.49
Marathwada	17.81	8.11	100	8.28	5.51	100
Total	219.37			150.42		

SPATIAL PATTERN OF URBANISATION :

Urbanization being a complex and many sided process its study requires a comprehensive approach. Urbanization is a process of population concentration which occures by increase in the number of points of concentration or agglomaration and by increase in the size of individual size of population concentration or agglomaration (Hauser 1965). According to the Lynch (1963) urbanization is the development and extension of urban factors. Urbanization and urban are the process and fact respectively. According to Alam and Polkhishevsky (1974), the concept of urbanization implies changes in the nature of people's activity in the ratio between the population engaged in agricultural activity and rest of the population.

The studies in urbanisation are generally carried out with reference to their regional setting. In the present study attempt had been made to find the degree of urbanization for all 26 districts of Maharashtra for last three (1961, 1971, 1981) census period.

The percent share of urban population which indicates the degree of urbanisation has been calculated for all districts of Maharashtra and the districts have been classified in to four classes. The areas where urbanization is less than 20% are classified as low urban areas. The areas where urbanisation is between 20 to 30 percent are classified as areas of moderate urbanization. High urbanization indicated

where it is between 30 to 60 percent and the areas having more than 60 percent, are classified as very highly urbanized areas. The Fig. 3.3 A,B,C indicated the degree of urbanization during the various census periods.

In 1961 out of 26 districts of Maharashtra, 16 districts namely Raigad, Ratnagiri, Dhulia, Ahmednagar, Satara, Sangli, Kolhapur, Augrangabad, Parbhani, Beed, Nanded, Osmanabad, Buldhana, Yeotmal, Bhandara and Chandrapur have low degree of urbanization. Six districts Nasik, Jalgaon, Solapur, Akola, Amravati and Wardha have moderate urbanisation. High urbanisation is found in Thane, Pune and Nagpur districts of Maharashtra. Very high degree of urbanization is found in Greater Bombay district and it has maintained it till the recent census year.

In 1971; fifteen districts have maintained their low degree of urbanisation.only one district Kolhapur shows the increase in percentage of urban population. Moderate degree of urbanization is observed at seven districts of Maharashtra They are Nasik, Jalgaon, Solapur, Kolhapur, Akola, Amravati and Wardha. The high and very high degree of urbanisation is found at all those districts in 1961 classification.

In the year 1981; there is a considerable change in the degree of urbanization. Low degree of urbanization is observed at Raigad, Ratnagiri, Dhulia, Ahmednagar, Satara, Parbhani, Beed Nanded, Osmanabad, Buldhana, Yeotmal, Bhandara and Chandrapur districts. Eight districts, Jalgaon, Sangli,

Solapur, Kolhapur, Aurangabad, Akola, Amravati and Wardha indicate moderate degree of urbanization. Four districts, Thane, Nasik, Pune and Nagpur are included in high degree of urbanization. Very high degree urbanization is found at Greater Bombay district.

The regional analysis of the degree of urbanisation indicates that, very high urbanization is found in Bombay division (54.97%). Pune division has a share of only 19.92% urban population of Maharashtra. Nagpur division shares 17.00% urban population and Marathwada division shares only 8.11% of the total urban population of Maharashtra.

PERCENT SHARE OF CLASS I CITY POPULATION :

The analysis of percent share of Class I city population to the urban population of the districts shows that Sangli, Parbhani, and Osmanabad districts, the share of Class I city population is less than 40% of the total urban population of the district. These districts have only one Class I city each. Ten districts namely Thane, Nasik, Dhulia, Jalgaon, Ahmednagar, Nanded, Akola, Amravati, Bhandara and Chandrapur have moderate share of Class I city urban population ranging between 40 to 60 percent. Six districts of Maharashtra Bombay, Pune, Solapur,Kolhapur, Aurangabad and Nagpur have very high share of urban population occupied by Class I cities. Out of these six districts, the districts of Bombay is entirely urban where the percentage

of Class I city population to the district population is 100 percent.

Other five districts have very large urban agglo-maration and the percent share of Class I city population is more than sixty percent.

RANK ORDER FLUCTUATION OF CITIES :

There are three important aspects of urbanization process. They are:one, the spatial and economic changes which influence the character of urban places, two, the emergence the system of cities, three, physical growth of cities. In this study an attempt had been made to find out the changes in the rank order of cities in Maharashtra. (Mulik 1982).

The fluctuation of the rank and the maximum variation in the rank of cities is shown in Fig. 3.4. The figure clearly indicates that the first ranking city Bombay in 1901 has maintained its rank throughout the last eight decades. At the same time for 4th and 5th ranking cities Solapur and Kolhapur have also maintained their ranks throughout the period. Pune was second ranking city up to 1921. But in 1931 it was shifted to thrid rank and the third ranking city Nagpur was shifted to second rank. During 1931 and 1941 Nagpur was second ranking city and Pune was thrid ranking city. But again in 1951 Pune occupied 2nd rank and Nagpur was shifted to 3rd rank. But in the next decade (1961) again Nagpur occupied 2nd rank and Pune was shifted to 3rd
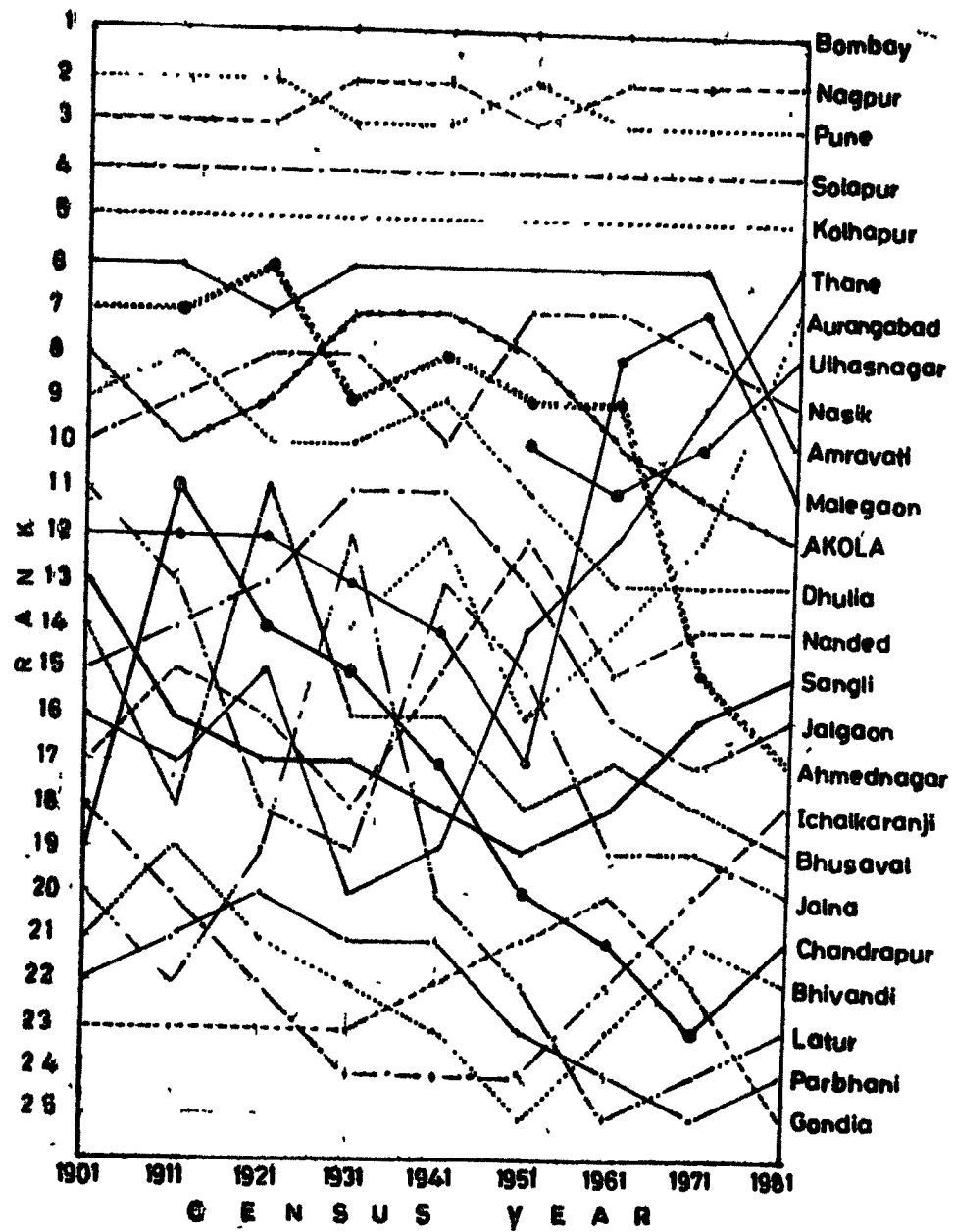
RANK FLUCTUATION OF CLASS I CITIES
1901-81

Fig. 3·4

T A B L E - 3.5

RANKING OF CITIES AND RANK FLUCTUATION

Sr. No.	Class I City	1901	1911	1921	1931	1941	1951	1961	1971	1981
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1.	Bombay	1	1	1	1	1	1	1	1	1
2.	Nagpur	3	3	3	2	2	3	2	2	2
3.	Pune	2	2	2	3	3	2	3	3	3
4.	Solapur	4	4	4	4	4	4	4	4	4
5.	Kolhapur	5	5	5	5	5	5	5	5	5
6.	Thane	16	17	15	20	19	14	12	9	6
7.	Aurangabad	-	-	-	14	12	16	14	12	7
8.	Ulhasnagar	-	-	-	-	-	10	11	10	8
9.	Nasik	10	9	8	8	10	7	7	8	9
10.	Amravati	6	6	7	6	6	6	6	6	10
11.	Malegaon	12	12	12	13	14	17	8	7	11

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
12.	Akola	8	10	9	7	7	8	10	11	12
13.	Dhulia	9	8	10	10	9	11	13	13	13
14.	Nanded	17	15	16	18	15	12	15	14	14
15.	Sangli	13	16	17	17	18	19	18	16	15
16.	Jalgaon	15	14	13	11	11	13	16	17	16
17.	Ahmednagar	7	7	6	9	8	9	9	15	17
18.	Ichalkaranji	18	20	22	24	24	24	22	20	18
19.	Bhusaval	14	18	11	16	16	18	17	18	19
20.	Jalna	11	13	18	19	13	15	19	19	20
21.	Chandrapur	19	11	14	15	17	20	21	23	21
22.	Bhivandi	21	19	21	22	23	25	23	21	22
23.	Latur	20	22	19	12	20	22	25	24	23
24.	Parbhani	22	21	20	21	21	23	24	25	24
25.	Gondia	23	23	23	23	22	21	20	22	25

rank. Since then Nagpur is a 2nd ranking city of Maharashtra and Pune is 3rd ranking city of Maharashtra. From 1961 to 1981 first five cities namely Bombay, Nagpur, Pune, Solapur, Kolhapur indicate no change in their ranking. In 1901 Amravati was 6th ranking city and comparatively it has maintained its 6th rank up to 1971. But in 1981 it is shifted to 10th rank and surprisingly 16th ranking city of Thane in 1901 after several fluctuation occupied 6th rank in 1981. In 1901 7th rank occupied by Ahmednagar but in 1981 it is shifted to 17th rank and Aurangabad which was 14th rank city in 1931 occupies 7th rank in 1981.

Very high fluctuation in ranking is observed for Dhulia, Akola, Malegaon, Chandrapur, Thane, Latur and Bhusaval cities. Table no. 3.5 shows the rank fluctuation of cities in Maharashtra. It is observed that new industrial towns like Thane, Aurangabad, Ulhasnagar and Nasik have occupied higher ranks in the recent years.

RANK SIZE RELATIONSHIP OF CITIES :

The process of urbanization reflects the spatial geographical characteristic of a region. To identify whether a rank size rule (Zipff 1949) is applicable to the cities of Maharashtra. The rule has been applied to find out the actual size distribution of cities in the study region.

The rank size rule which states that, if all the urban settlement in an area are ranked in descending order of

T A B L E - 3.6

RANK SIZE RELATIONSHIP OF CITIES
1981

Rank	Class I City	Reciprocal of R 1/R	Actual Population Pa	Expected Population Pe
1.	2.	3.	4.	5.
1.	Bombay	1.00000	82,27,332	33,73,468
2.	Nagpur	0.50000	12,15,415	16,86,734
3.	Pune	0.33333	12,02,848	11,24,489
4.	Solapur	0.25000	4,10,707	8,43,367
5.	Kolhapur	0.20000	3,40,310	6,74,694
6.	Thane	0.1666	3,09,271	5,62,245
7.	Aurangabad	0.14290	2,93,215	4.81,924
8.	Ulhasnagar	0.12500	2,73,332	4,21,683
9.	Nasik	0.11111	2,62,019	3,74,829
10.	Amravati	0.10000	2,61,387	3,37,346
11.	Malegaon	0.09091	2,45,769	3,06,678
12.	Akola	0.08333	2,25,402	2,81,122
13.	Dhulia	0.07692	2,10,927	2,59,497
14.	Nanded	0.07143	1,90,819	2,40,962
15.	Sangli	0.06667	1,52,382	2,24,897
16.	Jalgaon	0.06250	1,45,254	2,10,842
17.	Ahmednagar	0.05882	1,43,915	1,98,439

1.	2.	3.	4	5.
18.	Ichalkaranji	0.5556	1,33,704	1,87,415
19.	Bhusaval	0.05263	1,23,127	1,77,550
20.	Jalna	0.05000	1,22,246	1,68,673
21.	Chandrapur	0.04762	1,15,352	1,60,641
22.	Bhivandi	0.04545	1,15,256	1,53,339
23.	Latur	0.04338	1,11,961	1,46,672
24.	Parbhani	0.04167	1,09,328	1,40,561
25.	Gondia	0.04000	1,00,342	1,34,938
N	25	= 4.45880	15041620	

The formula used to calculate the expected

population of primer (primate city) city,

(P_1) is as follows :

$$P_i = \frac{Pa}{1/R}$$

population size, the population of nth city will be 1/nth
the size of the largest city and the population of other cities
will be arranged according to the series

$$1, \ 1/2, \ 1/3, \ 1/4, \ \cdot \ \cdot \ \cdot \ \cdot \ \cdot \ \cdot \ 1/n$$

The rank size rule is an empirical observation based
on the study of actual population statistics. If we examine
any region, the pattern of city size can be studied in relation
to rank size rule. In the present study rank size rule has
been expressed by plotting the rank and population of cities
on a log - log graph. Fig. 3.5 A,B shows the details of
actual and expected population of cities in Maharashtra. The
rank size distribution of cities when plotted on the graph
cleraly indicates that the actual population of 1st ranking
city, Bombay and 3rd ranking city Pune is larger than their
expected population. All remaining 23 cities have less actual
population than the expected population Table 3.6 indicates
the actual and expected population of different cities of
Maharashtra.

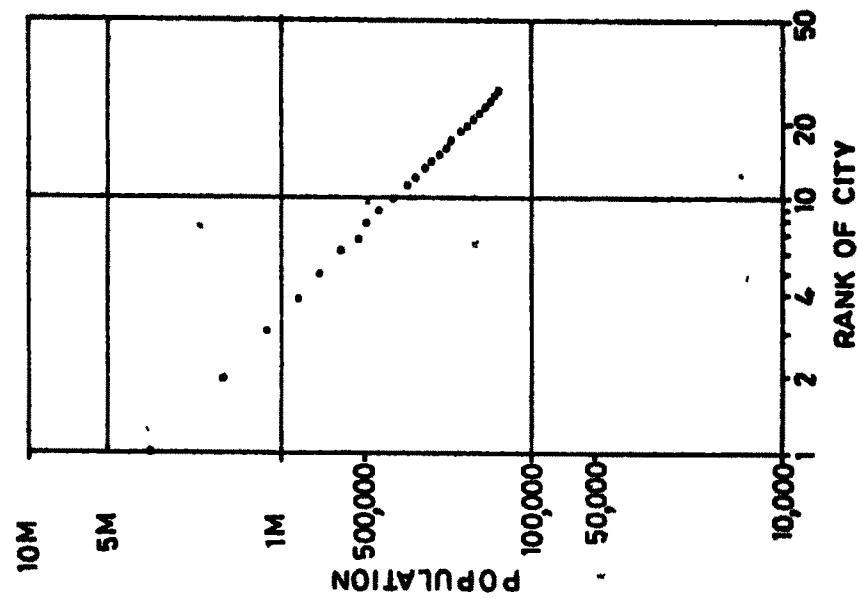SPATIAL PATTERN OF DISTRIBUTION :

To analyse the pattern of city distribution, nearest
neighbour analysis has been used. There are clusters of
urban settlements in some parts, while in others, they are
sparcely distributed. The statistical technique called the
" nearest neighbour analysis " developed by plant ecologist
(Clark and Evans, 1954) has been used to analyse the spatial

RANK SIZE RELATIONSHP OF CITIES IN MAHARASHTRA
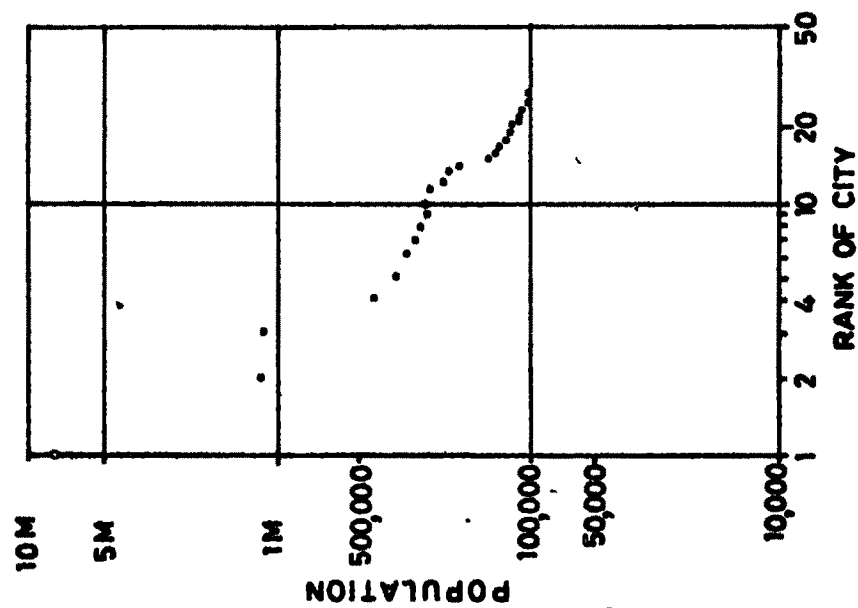
Fig.3·5 A

Fig.3·5 B

distribution of cities. The pattern of settlement distribution has already been studied by several geographers. In this regard, the work of Dacey (1962), Bursh (1953), King (1962), Gettis (1954) and Reddy (1970) is worth mentioning.

The technique of ' nearest neighbour analysis ' is very useful in studying the point pattern. It is calculated by the following equation :

$$ * \quad R - \bar{D}obs \sqrt{\dfrac{}{\bar{D}ran}} \quad \dots \dots \quad I $$

Where - " $\bar{D}obs$ " is the measured mean distance between nearest heighbour point observed in given area.

" $\bar{D}ran$ " is the expected menn distance for similar number of points randomly distributed in the same area.

" R " is the nearest neighbour index

$$ \bar{D}ran = \dfrac{1}{2\sqrt{\dfrac{}{N/A}}} \quad \dots \dots \quad II $$

Where - " N" is the number of urban settlement in study aregion

" A " is the area of spatial unit

Hence

$$ R = \dfrac{\bar{D}obs}{1 + \left(2\sqrt{\dfrac{}{\{ N/A \}}} \right)} \quad \dots \dots \quad III $$

It can be written in simplified form as

$$ R = 2\bar{D}obs \sqrt{\dfrac{}{N/A}} \quad \dots \dots \quad IV $$

Using the above formula nearest neighbour index has been calculated for entire region. Considering a single unit. Since the study area presence a viusible contrast in density pattern and spaing of cities the entire area is divided in to four administrative divisions and ' R ' values have been calculated.

The pattern of distribution has been studied by considering the revised ' R ' value scale given in table 3.7.

T A B L E - 3.7

REVISED ' R ' VALUE SCALE

Sr. No.	' R ' Value	Description
1.	0 to 0.15	absolute clustering
2.	0.16 to 0.50	linear clustering
3.	0.51 to 0.90	clustered grouping
4.	0.91 to 1.20	random distribution
5.	1.21 to 1.40	near uniform
6.	Above 1.40	Uniform

* R. Hammond and Mc Cullage (1974) " Quantitative Techniques in Geography : An Introduction " pp. 238-239.

SPATIAL PATTERN OF DISTRIBUTION :

The spatial pattern of distribution has been studied by dividing region into four administrative divisions. The four divisions show wide contrast in geographical social and economic conditions, where the degree of randomness differs considerably. The spatial contrast in the degree of randomness is shown in Fig. 3.6.

The Bombay division comprises seven districts of Maharashtra where the development of transport and industry has influenced the distribution of cities. The area has nine cities distributed in a cluster manner, where the degree of randomness is 0.89.

The Pune division includes six districts of Maharashtra where agricultural plays important role in the economy of the region. There are six cities in the area, found distributed in near to uniform manner where, the degree of randomness is 1.23.

The Marathwada division, comprises at five districts of Maharashtra where six cities are found to be randomly distributed where the degree of randomness is 1.15.

In Vidarbha region there are eight districts of Maharashtra and five cities are found distributed in the uniform manner where the degree of randomness is 1.49. (Fig.3.6)
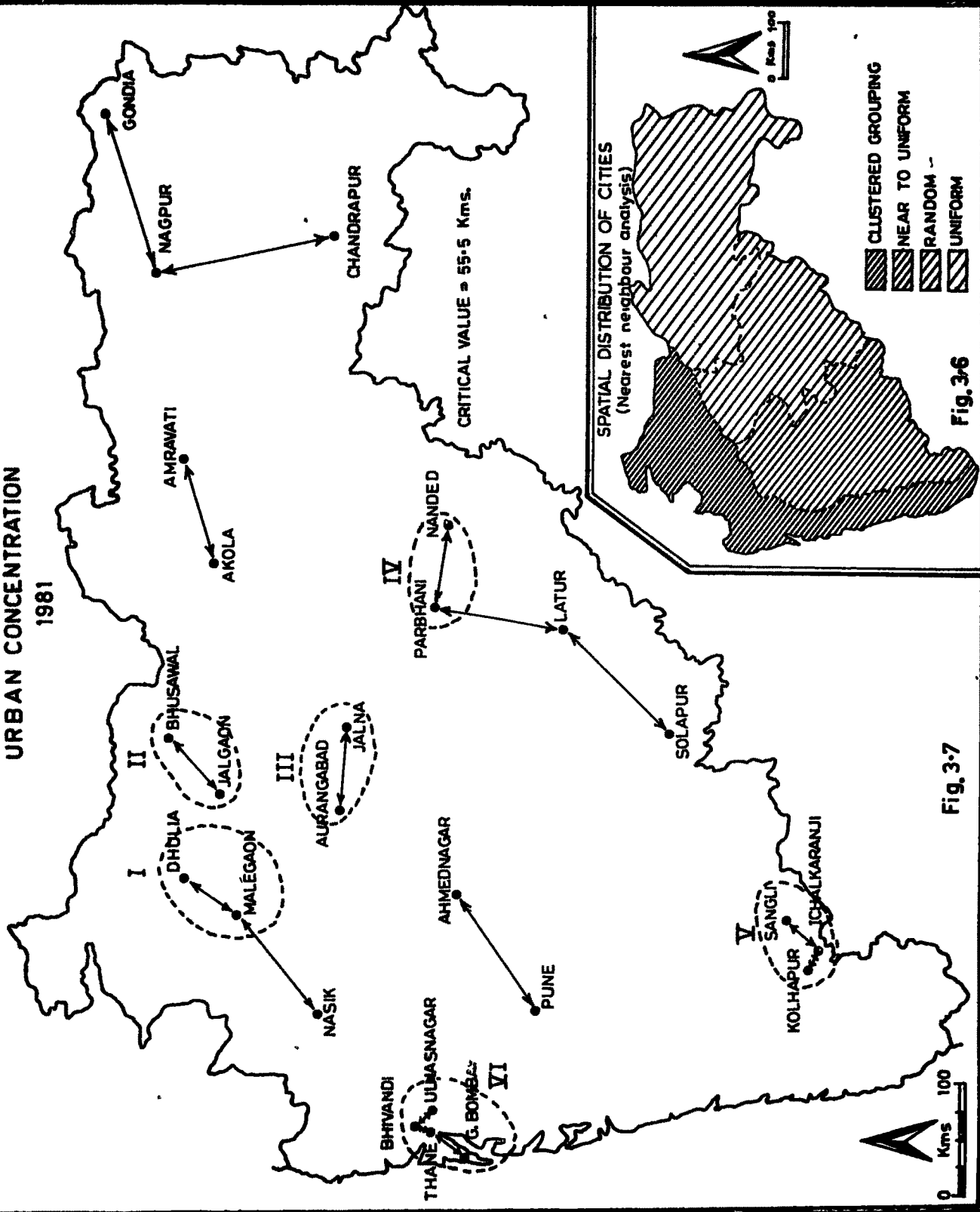
URBAN CONCENTRATION
1981

CRITICAL VALUE = 55·5 Kms.

Fig, 3·7

GONDIA
NAGPUR
CHANDRAPUR
AMRAWATI
AKOLA
NANDED
IV
PARBHANI
LATUR
SOLAPUR
BHUSAWAL
II
JALGAON
III
JALNA
AURANGABAD
DHULIA
I
MALEGAON
AHMEDNAGAR
NASIK
PUNE
SANGLI
V
KOLHAPUR
ICHALKARANJI
BHIWANDI
ULHASNAGAR
VI
G. BOMBAY
THANE

Kms
100
0

SPATIAL DISTRIBUTION OF CITIES
(Nearest neighbour analysis)

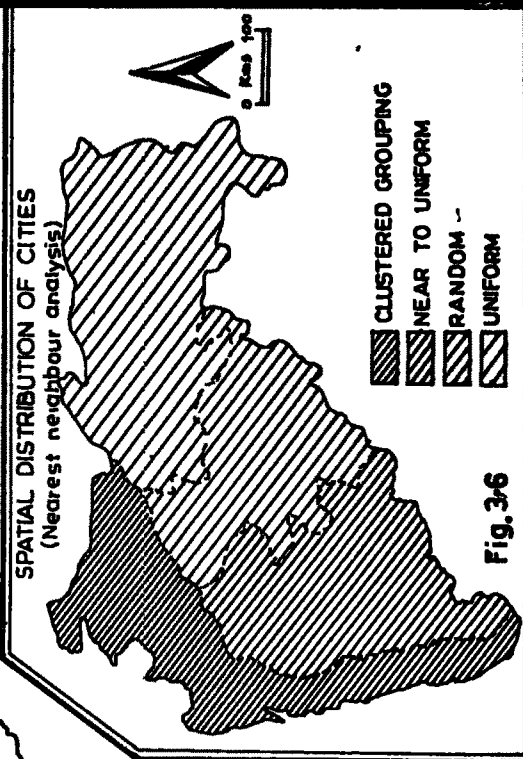CLUSTERED GROUPING
NEAR TO UNIFORM
RANDOM
UNIFORM

Fig. 3·6

Kms 100
0

The ' R ' value calculated for the entire study area, indicates random distribution, where the degree of randomness is 1.14.

DEGREE OF CONCENTRATION :

Considered

Close distribution of settlement is (consider) to be a concentration and a wide distribution is (consider) to be a dispersion. The concentration of urban settlement is identified by a simple method, where a distribution in a region contains a number of discrete concentration. The point pattern is consider to be related as a group of concentration if a distance of seperation between the settlements is less than the critical distance.

The entire study area has a random distribution of cities where the degree of randomness is 1.14 and a critical value of 55.5 kms. Considering this critical value the concentration has been demarcated. In study area there are six concentration groups (Fig. no. 3.7). Out of these six groups, Greater Bombay group includes four cities namely, Bombay, Thane, Bhivandi, Ulhasnagar, Kolhapur city group includes three cities namely Kolhapur, Sangli and Ichal-Karanji. Other four groups indicate the concentration of pair of cities. Theyare : 1. Dhulia - Malegaon group 2. Jalgaon - Bhusaval group 3. Aurangabad - Jalna group 4. Parbhani and Nanded group. It is observed that Bombay division includes three concentration groups; Marathwada has two concentration groups; Pune division has one

concentration group and in Vidarbha all cities are found in isolation.

LEVELS OF DEVELOPMENT AND DISTRIBUTION OF CITIES :

In order to find out the relationship between the level of development and distribution of cities in Maharashtra; to the levels of development, have been measured for the four administrative divisions of Maharashtra. The following variables were consider for calculating the levels of development.

1. percentage of urban population to total population
2. percentage of literacy
3. percentage of net area sown
4. percentage of settlement electrified
5. average road length per 100 sq.km.
6. average rail length per 100 sq.km.
7. average number of post and telegraph offices per lakh population
8. average number of factory workers per lakh population
9. number of telephone per lakh population
10. number of banking offices
11. percentage of secondary and tertiory population

Considering the above items the data of 1971 census and 1978 socio-economic abstract has been considered for calculating levels of development.

The co-efficient of development of a division in terms of single variable is calculated by the following equation.

$$CDi = \frac{Pi}{PI} \times 100 \qquad \ldots \ldots I$$

Where

'CDi' is the coefficient of development for variable i.

'Pi' is percentage of variable i in the areal unit

'PI' is mean percentage of variable i in the study region.

Summering up all individual indices we get the composite index of development by following equation :

$$CID = \sqrt{\frac{CDi_1 + CDi_2 + CDi_3 + \ldots + CDi_n}{N}} \qquad \ldots II$$

Where

'CID' is composite index of development

'N' is number of variables

The levels of development are calculated for all four divisions. The composite index of development is given in table no. 3.8. The table 3.8 also shows percent share of class I cities and percent share of class I city population in each division. (Deshmukh 1979).

T A B L E - 3.8

COMPOSITE INDEX OF DEVELOPMENT AND
PERCENT SHARE OF CITIES AND CLASS
I CITY POPULATION.

Sr. No.	Division	% share of Class I cities	% share of Class I city Population.	Index of Development
1.	Bombay	36	65.89	12.79
2.	Pune	24	15.85	10.26
3.	Marathwada	20	5.51	8.43
4.	Vidarbha	20	12.75	9.00

The spatial analysis of levels of development shows
that Bombay division has 36% share of Class I cities and the
region has very high index of development where the development
of transport, industry and agriculture is found to be very
high. Out of the total population of Class I cities of
Maharashtra, 65.89% population is found in this area.

Pune division has 10.26 index of development. In
this area 24% cities and 15.85% of Class I city population
is found.

Marathwada and Nagpur division have low index of
development and they share 20% of Class I cities each.
Marathwada division has only 5.51% share of Class I city
population while Nagpur division has 12.75% share of Class I
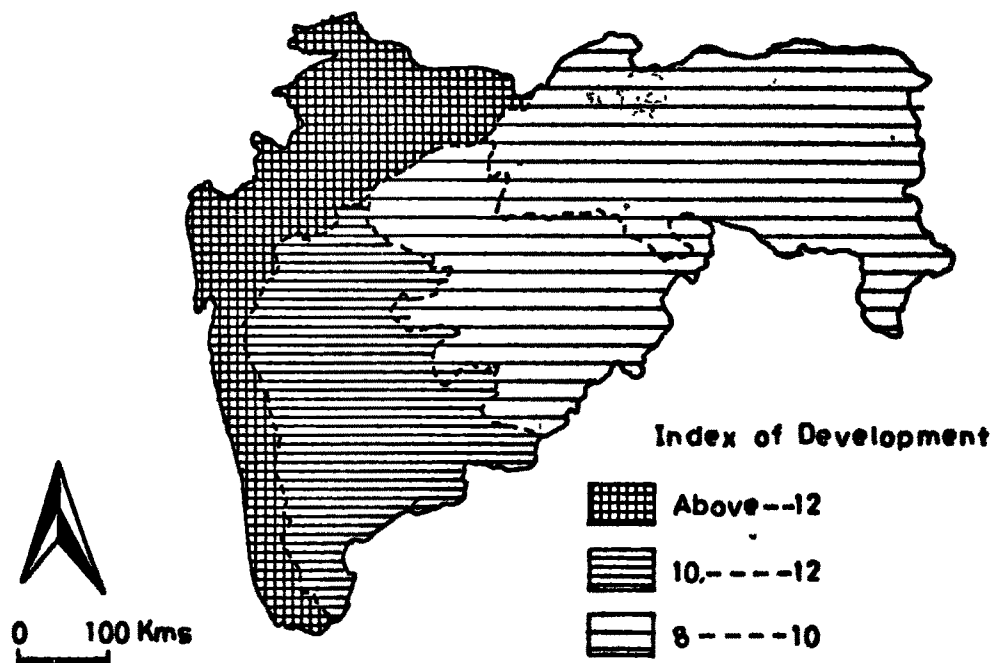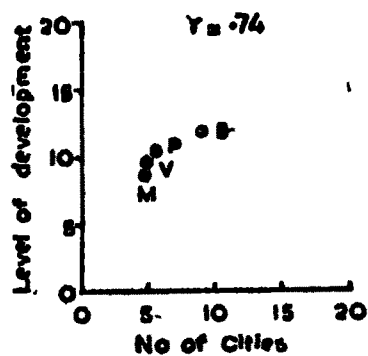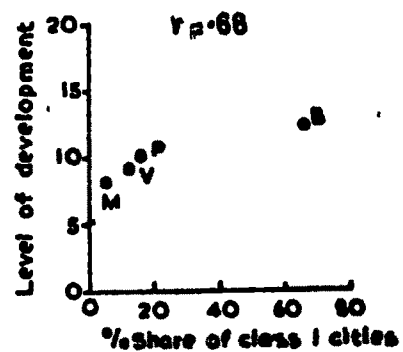city population. Fig. 3.8 shows the index of levels of

LEVELS OF DEVELOPMENT

Index of Development

Above --12

10,-----12

8 -----10

Fig. 3·8

Population in division

B = Bombay division
P = Pune division
M = Marathwada divi
V = Vidarbha division

A

Fig. 3·9

B

development of each division and Fig. 3.9 A shows the relationship between the level of development and number of cities in each division Fig. 3.9 B shows the index of development and percent share of Class I city population in each division.

The relationship between the index of development and number of cities shows very high positive correlation where r = .74, which is significant at 5% level of significance. In the same way index of development and percent share of Class I city population in each division also shows positive correlation of r = .68 which is also significant at 5% level of significance.

Concluding the salient feature of the distribution of cities in Maharashtra one might observe that apart from the geographical conditions, population density and level of economic development play an important role in the distribution of urban settlement.

It is observe that industrially developed area of Bombay division has high concentration of cities as compair to other areas.

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