

DEMOGRAPHIC STUDIES ON GUNTUR DISTRICT USING GIS

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Abstract: *The role of demographers in analysis of census data is of special value. This paper discusses the specific skills acquired by demographers and provides examples of how these skills can be very useful and important in planning in both the private and public sectors. The objective of this paper is to develop spatial distribution maps of future population as well as population density for the year 2031 for Guntur district. For this the outline Map of Guntur district was collected. Population data of the years 2001 and 2011 were collected. The population data for the future years like 2021 and 2031 were forecasted using geographic progression method. Areas of each mandal has been collected to find density of population. Using GIS shape files of the different mandals of the Guntur district has been developed. By linking the population data and density data, thematic maps were developed and presented. The future predicted thematic maps of population and density are very much useful for understanding of the trends in human populations and settlements in the district. This will further help in the planning and development of the district resources and infrastructure.*

KeyWords: GIS, Demography, Spatial distribution, Thematic maps

I. INTRODUCTION

Demographics is the study of a population based on factors such as age, race, and gender. Demographic data refers to socio-economic information expressed statistically, also including employment, education, income, marriage rates, birth and death rates and more factors. Governments, corporations, and nongovernment organizations use demographics to learn more about a population's characteristics for many purposes, including policy development and economic market research.

Demographics is the collection and analysis of broad characteristics about groups of people and populations. Demographic data is very useful for businesses to understand how to market to consumers and plan strategically for future trends in consumer demand. The combination of the internet, big data, and artificial intelligence is greatly amplifying the usefulness and application of demographics as a tool for marketing and business strategy.

Demography is useful because it studies human populations: their size, composition and distribution across place and the process through which populations change. Births, deaths and migration are the 'big three' of demography, jointly producing population stability or change. In a broad sense, demography is the statistical analysis of human populations. the study involves the measurements over time of statistical components namely fertility, mortality, and migration, then analyses them to come up with the trends and impacts of

these components on the populations under study over time and space.

Demography has developed its tools of measurement largely adopted from statistics hence the close relationship with statistics. it also borrows heavily from other social sciences including sociology and economics especially in determining causes of certain trends as analysis the analysis shows. The results obtained by studying and analyzing population trends are very important on the basis of giving us the ability to make informed decisions concerning populations now and in the future.

Population studies help us to know how far the growth rate of the economy is keeping pace with the growth rate of the population. If the population is increasing at a faster rate, the pace of development of the economy will be slow. The government can undertake appropriate easures to control the growth of the population and to accelerate the development of the economy.

The knowledge of demography is of immense importance for a democratic political system. It is on the basis of the census figures pertaining to different areas that the demarcation of constituencies is done by the election commission of a country. The addition to the number of voters after each election helps to find out how many have migrated from other places and regions of the country.

Political parties are able to find out from the census data the number of male and female voters, their level of education, their age structure, their level of earning, etc. On this basis, political parties can raise issues and promise solutions in their election manifestos.

BENEFITS OF POPULATION STUDIES:

1. If the population is above the optimum size, the district will be able to make better use of its resources.
2. The size of markets will increase. This should enable firms to take greater advantage of economies of scale.
3. There may be an increase in factor mobility if the rise has resulted from an increase in the birth rate or immigration. Expanding industries can recruit new workers to the labour force. These people are likely to be familiar with new ideas and methods. If this is the case, firms training costs will be reduced.
4. Extra demand will be generated. This is likely to stimulate investment and this may lead to introduction of new technology.
5. A rise in the labour force presently due to net immigration and in the future, caused by a rise in the birth rate. Net immigration will bring in more

workers. More children being born will increase the dependency ratio in the short term but in the long term, will result in more workers.

OBJECTIVES OF THE PRESENT STUDY:

- 1.To collect the population data and map of the study area.
- 2.To estimate the future population of Guntur district for the year 2031.
- 3.To develop thematic maps of population & density for the year 2031
- 4.To create Spatial distribution maps of population statistics of Guntur district.

II. STUDY AREA: GUNTUR DISTRICT

Guntur district which is the coastal district of ANDHRA PRADESH. By adding certain Taluks of the abolished Guntur District in 1859. Again in 1925, there are no changes in its jurisdiction except some minor changes. The District is divided into 57 mandals

With its district headquarters at Guntur is one of the coastal districts of Andhra Pradesh. Guntur district was formed on the 1 October, 1904 after bifurcating Krishna and Nellore districts. Prior to 1859, there was Guntur district with Headquarters at Guntur but with a different jurisdiction. In 1859, the district was abolished and was divided up between Machilipatnam and Rajahmundry districts which were renamed as Krishna and Godavari. In 1904, Guntur district was constituted into a separate independent district with the areas of the Taluk of Bapatla, Tenali, Sattenapalli, Narsaraopet, Vinukonda and Palnadu of old Krishna district, Guntur, and Ongole taluk from Nellore district. 57 mandals have come into existence in Guntur district with effect from 25-5-1985 in the place of east while taluks and Firkhas. The Krishna River forms the north eastern and eastern boundary of the district, separating Guntur District from Krishna District.

The District is bounded on the North by Krishna and Nalgonda district of Telangana State, on the west by Prakasam and Mahaboobnagar districts, on the South by Prakasam district, and on the East by Krishna district and Bay of Bengal. It is lies between 15° 18' and 16° 50' of the Northern latitude and 79° 10' and 80° 55' of the eastern longitude. The area of the district is 11,391 sq kms, having a coast line.

Among the other minor hill streams and rivulets in the district, the most important are the Gundlavagu near Durgi, the Golivagu near Rentachinthala, and the Dandivagu near Gurazala. Apart from the above mentioned rivers and streams, the Romperu drainage, the Tungabhadra drain, the Bhattiprolu drain and the Repalle drain are the drainage facilities available in the district.

The Krishna delta lies partly in Guntur district and its tributaries Munneru, Chandravanka, Naguleru, Guntur Channel, and Guntur Branch Canal which drain the area in a south-easterly direction.

It is typical of the wider deltas along the southeast coast of India (known as the Coromandel Coast). The braided stream

channels, broad floodplain, and extensive sandbars suggest that this part of the Krishna River flows through relatively flat terrain and carries a substantial amount of sediment, especially during the monsoon season.



Fig.1. Study Area Guntur district

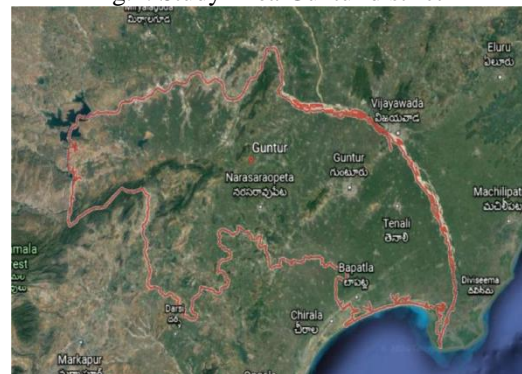


Fig.2. Study Area Guntur district on Google earth

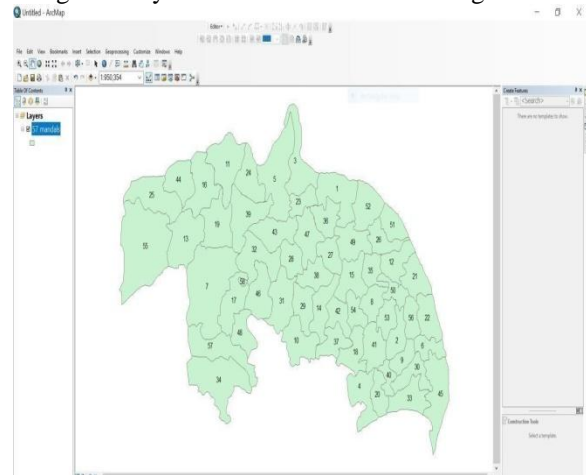


Fig.3. Study Area Guntur district extracted in GIS

III. DATA COLLECTION

Data collection is defined as the “process of gathering and measuring information on variables of interest, in an established systematic fashion that enables one to answer queries, stated research questions, test hypotheses, and evaluate outcomes.” Data collected: 2001 population data Mandal wise of Guntur District 2011 population data Mandal wise of Guntur District.

GUNTUR DISTRICT MANDAL LIST

The following table provides the details of Guntur district.

Table.1. Guntur District Mandal List

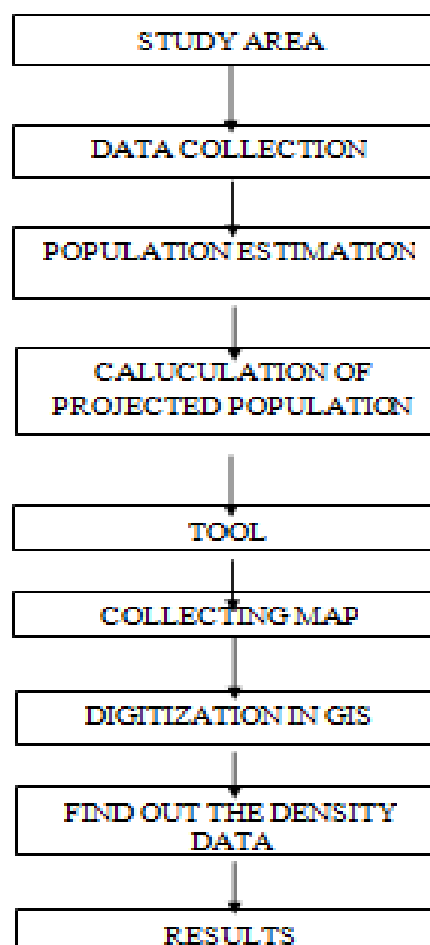
S.NO	MANDALS NAME	AREA (Sq.m)	2001 POPULATION	2011 POPULATION
1	AMARAVATHI	280.06	64221	66277
2	AMRUTHALUR	128.60	46960	44713
3	ATCHAMPET	249.151	55722	58447
4	BAPATLA	207.726	137522	143825
5	BELLAMKONDA	409.927	30791	38455
6	BHATTIPROLU	106.095	51385	50252
7	BOLLAPALLI	644.256	55378	58086
8	CHEBROLU	124.139	68814	72141
9	CHERUKUPALLE	95.994	58484	60385
10	CHILAKALURIPET	214.094	147171	153629
11	DACHAPALLI	297.265	68062	75233
12	DUGGIRALA	158.403	60420	62655
13	DURGI	301.927	44640	49059
14	EDDLAPADU	176.284	49492	56321
15	GUNTUR	186.154	601543	779289
16	GURAGADA	253.35	62246	66070
17	IPUR	206.572	43453	46714
18	KAKUMANU	155.637	43871	40681
19	KARAMPUDI	248.096	50317	52367
20	KARLAPALLEM	114.188	49243	50320
21	KOLLIPARA	165.203	57510	56662
22	KOLLUR	164.18	55942	55323
23	KROSURU	104.6	55782	56308
24	MACHAVARAM	190.125	48808	52469
25	MACHARLA	290.686	100218	113048
26	MANGALGIRI	134.262	136264	160303
27	MEDIKONDURU	128.731	56094	60144
28	MUPPALA	127.851	41507	42509
29	NADENDLA	152.595	61906	68978
30	NAGARAM	142.564	51388	50262
31	NARASARAOPETA	236.698	179688	185097
32	NEKARIKALLU	248.907	61859	63349
33	NIZAMPATNAM	181.478	60929	59973
34	NUZENDLA	430.455	52130	52853
35	PEDDAKAKANI	112.73	64693	73689
36	PEDDAKURAPADU	143.512	48569	50030
37	PEDANANDIPADU	139.05	44042	41980
38	PIRANGIPURAM	146.794	60869	63449
39	PIDUGURALLA	270.126	105870	122319
40	PITTALAVANIPALEM	67.468	38892	38609
41	PONNUR	173.544	123067	123417
42	PRATIPADU	122.682	49077	49390
43	RAJUPALEM	21.831	42345	45213
44	RENTACHINTALA	183.118	46622	49827
45	REPALLE	294.241	104194	111969
46	ROMPINCHARLA	204.592	60270	62060
47	SATTENAPALLE	195.312	123697	56721
48	SAVALYAPURAM	139.265	36857	37994
49	TADIKONDA	191.51	65306	67962
50	TENALI	93.497	224107	240031

51	TADEPALLI	126.527	80887	99428
52	TULLUR	206.072	54492	54081
53	TSUNDUR	111.789	46824	45778
54	VATTICHERUKURU	102.97	44952	45773
55	VELDURTHI	701.839	45927	49054
56	VEMURU	108.621	44079	43586
57	VINUKONDA	287.26	99738	112498

IV. METHODOLOGY

We are following this methodology for creating the Population and density maps. The following methods are followed they are study area, Data collection, population estimation, GIS tools, digitization, results & conclusion.

FLOW CHART:



POPULATION ESTIMATION:

Estimated the population data of 2021 ward wise of Vijayawada city by

Arithmetic mean method and Geometric mean method
 Arithmetic mean = population in 2011+ n(change in population)

Geometric mean = Last decade population x (1 + i/100)ⁿ

P2021 = P2011 x (1 + i/100)ⁿ.

Where i= percentage change in population n=number of decades

Table.2. Population Data

S.NO	MANDALS NAME	2021 POPULATION
1	AMARAVATHI	68400
2	AMRUTHALUR	47574
3	ATCHAMPET	61305
4	BAPATLA	150417
5	BELLAMKONDA	48027
6	BHATTIPROLU	49144
7	BOLLAPALLI	60926
8	CHEBROLU	75629
9	CHERUKUPALLE	62348
10	CHILAKALURIPET	160362
11	DACHAPALLI	83160
12	DUGGIRALA	64973
13	DURGI	53915
14	EDDLAPADU	64092
15	GUNTUR	1009556
16	GURAGADA	70129
17	IPUR	50220
18	KAKUMANU	37723
19	KARAMPUDI	54500
20	KARLAPALLEM	51421
21	KOLLIPARA	55827
22	KOLLUR	54711
23	KROSURU	56839
24	MACHAVARAM	56405
25	MACHARLA	127520
26	MANGALGIRI	188583
27	MEDIKONDURU	64486
28	MUPPALA	43535
29	NADENDLA	76858
30	NAGARAM	61598
31	NARASARAOPETA	190669
32	NEKARIKALLU	64875
33	NIZAMPATNAM	59032
34	NUZENDLA	53586
35	PEDDAKAKANI	83936
36	PEDDAKURAPADU	51535
37	PEDANANDIPADU	40014
38	PIRANGIPURAM	66141
39	PIDUGURALLA	141325
40	PITTALAVANIPALEM	38328
41	PONNUR	123768
42	PRATIPADU	49705
43	RAJUPALEM	48275
44	RENTACHINTALA	53252
45	REPALLE	120324
46	ROMPINCHARLA	63903
47	SATTENAPALLE	253388
48	SAVALYAPURAM	39166
49	TADIKONDA	70726
50	TENALI	257086
51	TADEPALLI	122219
52	TULLUR	53673
53	TSUNDUR	44755
54	VATTICHERUKURU	46609
55	VELDURTHI	52394

56	VEMURU	43098
57	VINUKONDA	126890

CREATION OF THE DENSITY DATA:

Density = Population/Area

In below table we find out the 2011, 2011 & 2021 density by using population & area data of individual Mandals

Table 3: Density Data(Sample)

	MANDALS NAME	2001 Density	2011 Density	2021 Density	2031 Density
1	AMARAVATHI	316.68	326.7	337.29	347.96
2	AMRUTHALUR	377.04	359.63	342.42	394.22
3	ATCHAMPET	291.47	482.3	320.68	287.52
4	BAPATLA	587.92	614.8	643.05	757.304
5	BELLAMKONDA	283.18	353.6	441.7	551.63
6	BHATTIPROLU	454.81	412.97	435.21	425.38
7	BOLLAPALLI	200.49	210.29	220.57	231.36
8	CHEBROLU	512.84	537.6	563.63	590.88
9	CHERUKUPALLE	590.84	611.8	629.96	650.44
10	CHILAKALURIPET	759.98	793.2	828.05	864.43
11	DACHAPALLI	260.5	287.9	318.29	351.82
12	DUGGIRALA	452.14	468.8	486.21	504.19
13	DURGI	1101.46	212	133.03	256.05
14	EDDLAPADU	385.391	438.56	499.08	403.33
15	GUNTUR	3391.84	4394.4	5692.4	7374.47
16	GURAGADA	248.06	2633.4	279.47	296.64
17	IPUR	228.05	246.15	264.6	283.34
18	KAKUMANU	245.94	228.05	210.93	196.09
19	KARAMPUDI	279.78	291.18	303.04	315.38
20	KARLAPALLEM	488.909	499.6	510.53	521.70
21	KOLLIPARA	334.44	473.16	466.19	319.86
22	KOLLUR	264.05	511.58	505.92	255.38
23	KROSURU	291.25	337.61	340.78	548.51
24	MACHAVARAM	1345.02	283.86	305.15	318.92
25	MACHARLA	422.904	228.5	370.55	494.85

CREATION OF THEMATIC MAPS

First shape file of the study area with subdivisions is to be created in GIS.

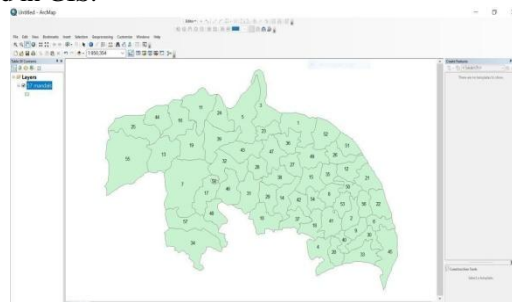


Fig.4. Shape file of Guntur district in GIS

Secondly the data collected is to be linked to the shapefiles.

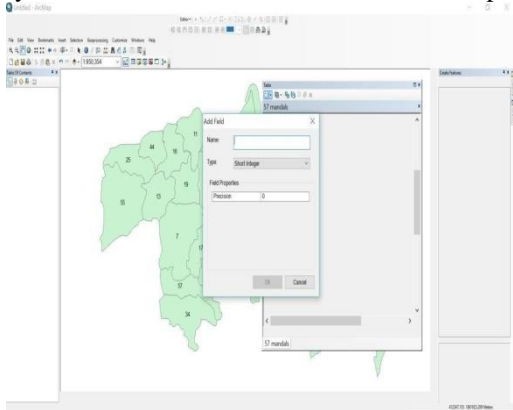


Fig.5. Linking of DATA with Shape files

CREATION OF COLOUR COMPOSITION IN GIS:

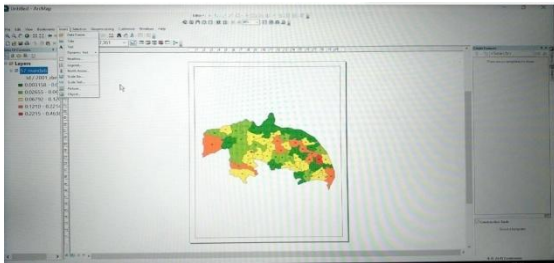


Fig.6. Creation of colour composites

V. RESULTS

The thematic maps developed for various features of the population data collected were presented below:

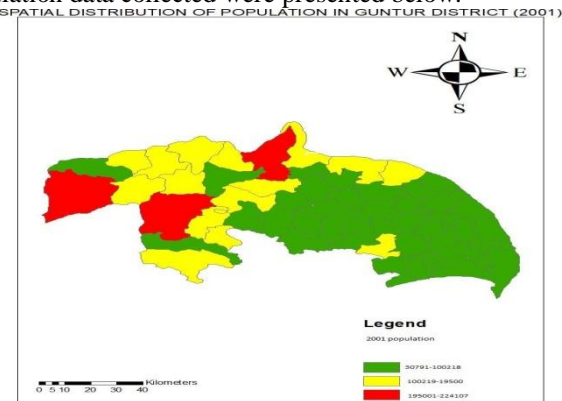


Fig.7. Spatial distribution of population in 2001

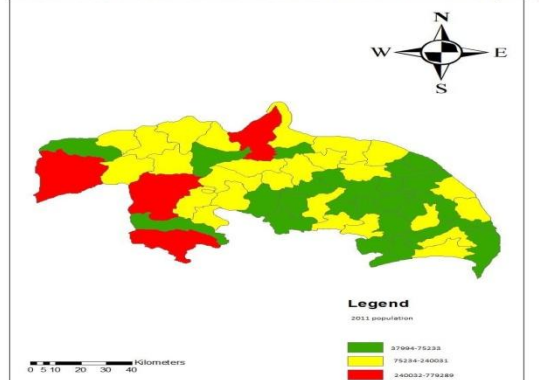


Fig.8. Spatial distribution of population in 2011

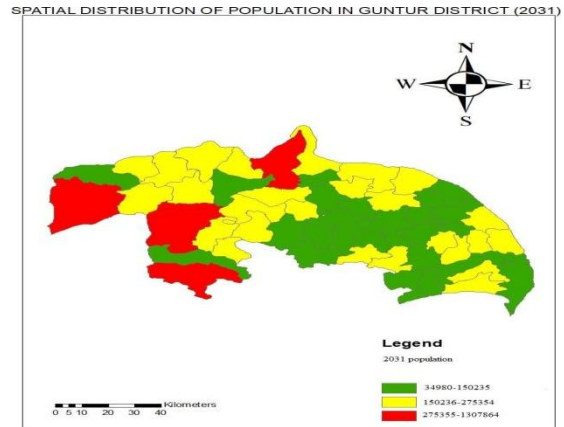


Fig.9. Spatial distribution of population in 2031

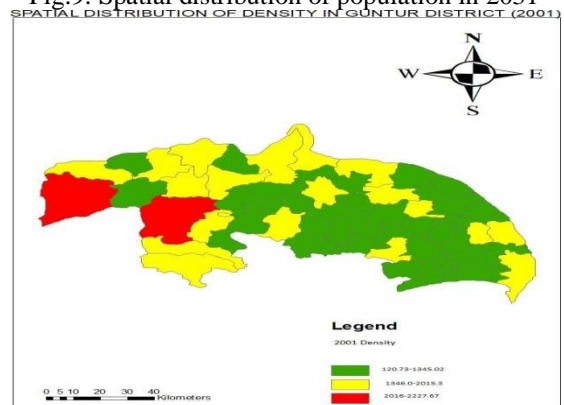


Fig.10. Spatial distribution of population density in 2001

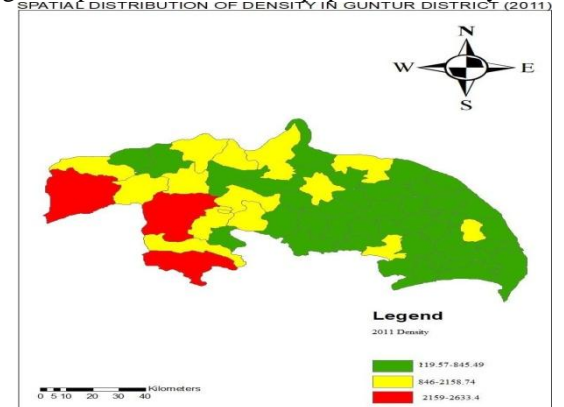


Fig.11. Spatial distribution of population density in 2011

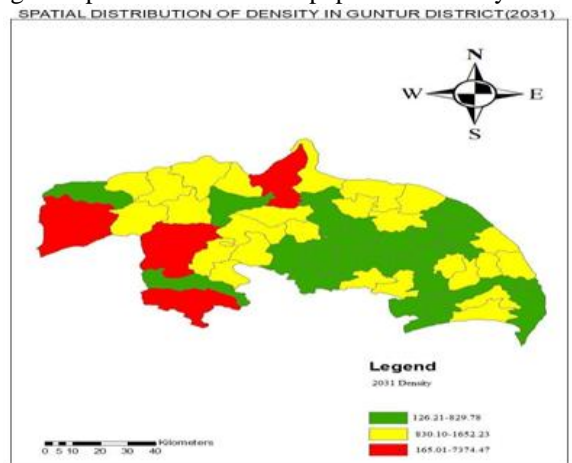


Fig.12. Spatial distribution of population density in 2031

VI. CONCLUSION

Demographic study was carried out for the Guntur district. Population and map data of the Guntur district were collected. Future population data for the year 2031 was calculated. Using GIS, thematic maps of the population as well as population density were developed. Population density of the future year of 2031 was developed. These population as well as densities maps are very useful for the urban planners for identification of hot spots for business, development of better road networks to avoid traffic congestion, etc

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