Geovisualization of Urban Densities Using GIS

Debabrata Nandi[1], Dhurjyoti Ray[2], Kamalakanta Mohanta[3], Kajal Mallik[4], Pramod Chandra Sahu[5]

[1, 2, 3, 4] Dept of RS & GIS
[5] Dept of Geology
[1, 2, 3, 4] North Orissa University
[5] MPC Atonomous College

Abstract- *Urban orchestrating is one of the main applications of GIS. Urban planners use GIS both as a spatial database and as an analysis and modelling implements. The applications of GIS vary according to the different stages, levels, sectors, and functions of urban orchestrating. With the incrementation in utilizer-cordiality and functions of GIS software and the marked decrease in the prices of GIS hardware, GIS is an operational and affordable information system for orchestrating. It is increasingly becoming a consequential component of orchestrating support systems. Recent advances in the integration of GIS with orchestrating models, visualisation, and the Internet will make GIS more subsidiary for urban orchestrating. The main constraints in the utilization of GIS in urban orchestrating today are not technical issues, but the availability of data, organisational change, and staffing.*

Keywords- Remote sensing, GIS, Demographic, KMDA

I. INTRODUCTION

Structural changes in the landscape alters the functioning of the ecosystem, which touches on the sustenance of natural resources (Orville et al., 2000) and human living (Grove and Burch, 1997). The discrete expansion of urban pockets is referred to as slump and is an urban characteristic feature (Ebrahimpour- Masoumi,2012). Urban slouch, an effect of the expansion of urban areas under pressure of various factors such as social and economic, etc., is increasingly becoming a foremost issue in many metropolitan areas (Ji et al., 2006; Ramachandra et al., 2012a). Urban sprawl is the growth of small urban settlements in the fringe or the sub-urban areas and these areas are devoid of any basic facilities (Adhvaryu, 2010; Kundu and Roy, 2012;).Urbanization that is regarded as a positive process linked to modernism, industrialization and global integration economically benefitted only a minority of the urban population (Bhatta, 2010; Sharma, 1985). The amount of solid surface in a landscape is a vital index of environmental quality. Impervious surfaces are specified as any surface which water cannot penetrate and which are mainly transportation and building rooftops (Bauer et al., 2007). Accurate and timely data on the extent of urbanization and the pace of increment is necessitated in order to avert the negative impacts on human habitat, which is of extreme concern to urban planners, civil engineers,

Environmentalists, etc. (Mesev et al., 2001; Ramachandra et al., 2012b). This involves reading the kinetics of urban social organization with its functions (Lu et al., 2004;). Planners have to to monitor the patterns of growth to understand and assess the future demand of urban land while balancing other land uses and providing basic amenities. Traditional surveying techniques are expensive, time consuming and inherently biased in sampling that hinders the understanding of urban phenomena. This has led to an increased interest in spatial research using temporal remote sensing data with Geographic Information System (GIS) techniques (Herold et al., 2002; Sudhira et al., 2004; Dewan et al., 2009). Remote sensing with digital image processing techniques helps to detect and monitor urban dynamics (Zhang et al., 2002; Ramachandra et al., 2012a). Temporal remote sensing data aids in understanding the varieties in the landscape using change detection (Tang et al., 2005). Spatial metrics aid in measuring the urban construction and practices of urban growth (Macleod and Congalton, 1998). The spatial metrics are advantageous in capturing the inherent spatial structure of landscape classes based on condition, size, centrality, etc., (Herold et al., 2003; Sudhira et al., 2004; Bharath et al., 2012a). Complexity measures of urban form were placed based on density, proximity, concentration, centrality, nuclearity, clustering and continuity (Galster et al., 2001).

II. STUDY AREA

The study area consists of kolkata municipal' corporation of west Bengal bounded by 22° 38' 24" N to 22° 26 24 N latitude and 88° 14' 24" E to 88° 21' 36" longitude and Cover about 6.48 sq k.m . KMDA Kolkata area constitue of several type Natiolal and International identified surprise things and communicate with other country area through Road way both Railway and truck way .water; transport through boat ship and also through aircraft to national and international country with export .Import and education It contain several bridge .National Mesum,Shipping corporation ,Air port

corporation ,Road truck Authority. Water-supply system are well developed and maintain by Kolkata Municipality, corporate electricity supply .Drainage patterned and Sewage treatment are conduct through municipality .Several National recognize hospital are found except this broad casting like Television Fm, Radio system are well developed.
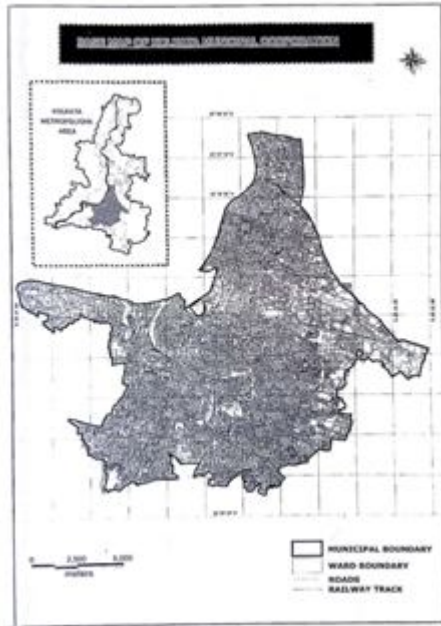
III. METHOD AND MEHTODLOGY

GEOREFERENCING OF THE MAP

Before starting Geo-referencing of map ,The map have to scanned in a color scanner with 300 dpi {dot per inch) and the scanned map were save in to tiff format and copied in the working directory. The map are than transfer in to topo - map of the definite scale and finally registered the data keeping minimum error. The control point was chosen carefully so that it is distributed uniformly on the image.

COLLECTION OF DATA AND SYNTHESIS OF DATA

Data collection include several sources (a) from topographical mapping on existing land use and their periodic up dating and monitoring, urban morphology and population estimation 'and other physical aspects of the urban environment slum detection, monitoring and updating .

Study of transport system and important aspect both in static and dynamic mode, Urbanization is inevitable when pressure on land is high agriculture income are low and population increases are excessive is the case in most of the developing country of the world.

Since satellite based Remote Sensing system have unique capability to provide repetitive coverage for any area on the earths surface this make it most suitable for monitoring and up dating especially for regional planning and analysis. There fore t0 study feasibility of such data product to study the urban expansion and land use, the department of space formulation an urban "SPRAWL" mission to study the urban SPRAW and Ian use The town and country planning were made to concerned development authorities, Kolkata metro-politan development authority. Several map & satellite imagery are given in following paper.

DEMOGRAPHIC DATA

Number of house hold In census a house hold is defined as a ' group of person who commonly live together and take their meals from a common kitchen. This table provides information on the number of house hold (including institutional and house lass house hold) in the town at the time of 1991 and 2001 census.

Women headed households. A house headed by a woman that is who has the primary authority and responsibility for the households affairs, usually as chief economic support. However in most country women are not usually enumerated as head of the house hold unless they are either living along one person house hold or no adult male in the house hold.

Number of occupied residential houses Number of occupied residential houses in respect of each town. A census house is holding or a part of building having a separate main entrance from the road or common country road recognized as separate unit. Population

Total population, male and female population of town as per census 1991 and 2001 is to be furnished

III. SLUMS

All the inhabitants of the areas, which have been notified as slum by state governments under any legal provisions or even recognized by them, are to be accordingly considered as slum population. Besides areas in cities or town, which satisfy the usual criteria for declaring an area as slum have also been included ,As per census of India, 1991, 2001, the slum area broadly consists of:-

(1)All specified area notified as slum by state/local government under UT Administration under any act,
(2)All area recognized as "slum" by state/local government under UT administration which may not have been formally notified as slum under any act,

(3)A compact area of at least 300 population or about 60-70 household of poorly built congested tenement,in un- hygienic environment usually with inadequate infrastructure and lacking in proper sanitary and drinking water facility,

Those who have not worked any time at all during the year preceding the date of enumeration are non workers. Non worker include.

(1)   Those engaged in household duties at home
(2)   Students
(3)   Dependents
(4)   Retired person
(5)   Beggars
(6)   Inmates of institutions
(7)   Other non worker

South	17414	16256	32529	7751	2358	2596	7708	1137	
Titagarh	20029	19214	33314	3255	1071	3223	7011	1453	
Uluberia	70705	53508	12546	1297	443	8193	4227	4054	
Ultarpar	10584	96292	26313	2803	508	1281	7402	6066	
Baidyab	78808	71555	12994	1078	1735	1187	3159	5333	

NAME OF District	Popul alion	Popul atlon	0-6 Popul otion	Sche dule Cast	Sche dule Trib	Liter ate i -. I	Illite rate	Tota l Wor	Non -Wor
Baidyab i (M)	Male	Femal	Perso	°erso	Pers	Pers	Pers	, D	Pers
Bally	56394	51835	8943	1011	595	8446	23762		
Bansber	14960	11130	24224	9110	1406	1938	6704	9355	
	55389	49023			23030	7478	2962	3237	
Barasal	13255	11820	20826	'	5 TO	'	4657	8953	
Barrack	11837	11314	23251	3285	1555	1764	5504	7651	
Bamipur	76299	68092	12343	9373	1150	1142	3015	4905	
Bhadres	23025	21888	3829	1116	209	3672	8184	1418	
	58t)40	48031	11531	1462	380	7784	28230!		
Bidhan	24315	19922	43330	5490	2561	3148	127504:		
Budge	83220	81001	14738	2046	2318	1265	3763	6288	
Champd	41165	34366	7395	6577	63	5230	2322	2373	
Chanda	57842	45404	13101	9334	290	6828	3496	3212	
Dum	84181	78006	13515	2298	889	125B	3634	5613	
Garulia	52890	48406	8602	7469	616	8283	1846	3415	
Gayespu		37376	7863	1442	257	5747	2244	2344	
Halisaha	28207	26841	4725	1098	877	4372	1131	1610	
Hugli-		57359	12458	2259	227	9284		3914	
Haora	86788	83418	13799	2885	1297	1366		5694	
Kalyani	54706	46046	94330	48759		7666		3469	
Kamarh		40169	8064	37787		5797	2415	2657	
Kanchra	16855	14595	29886	8598	6551	23B0		9928	
	65264	60927	10242	2277	962	1009	2520	3596	
Kolkata	61214	55256	9277	3816	760	9615	2031	3591	
Konnag	.	20728	39028	2748	9810	3382		1717	
	37901	34276	6211	4846	246	5755	1461	2474	
	79728	75723	16167	1715		1168	3862	5307	
Naihati	20230	18296	45529	5696	2131	2611		1196	
New	11377	10152	21350	2612	808:	1578	5742	6769	
North	41813	41379	6518	2321	94	7235	1083	2732	
North	63796	59872	9757	1817	1473	1030	2063	3851	
	11303	10700	19828	3106	1	1798	4019	7632	
Pujali	18030	16813	29869	1622	2481	2851	6327	1208	
Rajarhat	17665	16193	4418	5936	509	2055	1330	1117	2268
Rishra	14021	13159	28888	5063	1178	2048	6699	9400	
Seramp	62585	50720	12516	4021	127	8287	3043	3550	
Rajpur	10541	92442	17530	6391	262	1507	4715	6357	

NAME	TOTA L W AR D	Po pu AR EA	Pop 19 91	Pr.P opu 2001	Pr.P opu 2011	Pr.P opu 202 1	Pr.P opu 202 5	P.Dc n.199 1	P.Dem, n.20 0l	Slu m, Pock et	To.- Slum Popu
GAYESP UR	18	30	52 15 8	550 48	4700 0	540 00	560 00	1738	1334	18	14281
kANCHA RAPARA	24	9.0 7	10 01 94	126 191	1160 00	133 000	140 000	1104 6	1391 3	388	14223
BARASA T	30	31. 41	10 26 60	231 521	2140 00	245 000	258 000	3268	7370	20	39000
MADHA YAMGR AM	23	21. 32	10 70 00	255 451	1430 00	1G5 000	173 000	5018	7291	40	4959
NEW DARRAC KPUR	19	17. 17	63 79 5	831 92	7600 0	880 00	920 00	3715	484 S	26	15809
NORTH DUMDU M	30	26 45	14 99 65	220 042	2030 00	232 000	244 000	5669	8319	25	2662
DUMDU M	22	8.8 1	40 96 1	101 296	9300 0	107 000	122 000	4649	1149 7	20	19638
RAJARH AT GOPALP UR	27	34 97	17 20 00	271 811	2500 00	287 000	302 000	4918	7772	13	24817
DARUIP UR	17	9.0 7	37 65 9	449 13	4200 0	490 00	520 00	4152	4951	5	4560
SONARP UR RAJPUR	33	55 3	60 17 5	336 707	3170 00	363 000	388 000	1088	6088	72	0
SOUTH DUMDU M	3S	13 54	23 2S 11	392 444	3610 OO	414 000	436 000	1719 4	2898 4	64	97579
UlUBERI A	28	33. 72	15 51 72 5	202 113 00	1700 0	194 0C O	204 000	4601 4	S99	27	11946 8

BALLY	29	11.81	18 44 74	260 906	2180 00	250 000	263 000	1562 0	2209 1	229	13774 70073
UTTARP ARA	24	16.34	15 03 63	175 859	1600 00	184 000	1S9 000	9202 2	1076	26	0
KONNAG AR	19	4.42	62 20 0	721 77	7700 0	880 00	910 00	1407 2	1632 9	11	11026
SERAMP UR	2S 5	14.70	13 28	197 857	2130 00	243 000	250 000	91S05	1364 5	341	61219
IUIDHYA BATI	22 9	7.S 9	90 05 1	108 229	1150 00	132 000	136 000	1141 7	1371 7	40	0
CHAMPD ANI	22	6.47	10 10 67	103 246	1100 00	126 000	130 000	1562 0	1595 7	129	7S58 3
BHAOIS WAR	20 8	6.4 4	72 47 4	106 071	1130 00	130 000	134 003	1118 4	1636 S	6	56589
HOOGHL Y	30	17.23	1S 10 6	170 206	1820 00	208 000	213 000	8790	9355	91	17921
CHINSUR A	22	9.0 7	93 52 0	104 412	1110 00	127 000	132 000	1031 0	1151 1	60	18232
BANSBE R1A	15	8.4 9	30 00 0	338 58	3200 0	370 00	390 00	3S33	3937	20	6823
PUJAll	20	9.0 6	72 9S 1	755 31	7100 0	810 00	860 00	80516	S33 6	22	26486
BUDGU BUDGE	35 18	44	30 60 00	385 266	3670 00	419 000	448 0C0	6971	872 0	30	48403
MAHESH TAIA	33	7.1 2	22 48 21	250 768	2310 00	265 000	279 000	3157 5	3522 0	13	55937
BARANA GAR	35	10.96	26 66 89	314 507	2890 00	231 000	349 00	2435 1	2869 5	8	3607
KAMAR HAT1	35	19.4	27 59 90	34S 438	3200 00	367 000	387 000	1422 6	1796 0	82	93554
PAN HAT 1	123 1	3 2*.	11 40 85	124 213	1140 00	131 000	133 000	3521 1	3333 7	23	9S06 2
TITAGAR H	24	10.61	13 32 65	144 391	1320 00	152 000	160 000	12S6 0	1450 3	37	4459

8ARRAC KPORE	22	9 4 06	10 06	123 668	1140 00	131 000	138 000	1C6 34	1307 2	15	13774
NORTH BARRAC KPORE	22	8.8 1	40 96 1	101 29c	9300 C	107 00C	112 000	4649	1149 7	20	19638
GARULI A	35	30.41	30 49 52	442 335	40S0 0C	467 00C	493 000	1002 4	14S 42	34	10758 1
BHATPA RA	2f	11.55	13 27 0	215 303	198 COC	227 000	239 000	1148 9	1S6 40	23	19923
NAJHATI	23	8 2!	11 40 26	124 51C	1140 0C	131 000	13S 000	1377 1	1503 7	32	18733
HALISAH IAR	IS 91	21.57	55 S	821 35	6900 0	750 00	840 00	2536	3743	16	39429
KALYAN I	SC	51.7.	1 9S 04 3!	100 753	1317 00C	1S1 100 C	15S 1CC C	1836 9	1947 2	0	11323 6
HOWRA H	33	22.0	12 03 7!	162 18	1730 06	199 00C	104 000	5484	7352	41	42894
CHAN DAN NAGAR	14]	18 1	43 99 81 !	457 287	1530 00	74S S00 C	785 600 0	2378 2	2471 8	0	0
1C0LKAT A	23	64	5 10 28 1	113 30!	1210 CC	139 00C	142 00C	1856 6	174 S5	11	53755
RiShRA	21	6.7 88 35 !		116 47C	1070 CC	122 00C	129 00C	1286 1	1695 2	4	24303
khardaha	23	33. !	10 00 4!	164 223	15S0 0C	177 000	187 000	2936	4	0	49173

IV. BASE MAP OF KOLKATA METROPOLITAN AREA

The study area of Kolkata Metropolitan Area of West Bengal is bounded by 23° 3" N to 22° 21" N & 38° 00" E to 3SC 35"E It contains-mainly municipality area Canal, River, Railway truck rc&c way and KMA boundary.River.-The River passes through Pujali, Budgebudge .r/shishta, DumDum, aranagar, Kamarhati, Bally, Uttarpara, Konnagar.Risnra

hardtia, Titagarh, Serampur, Barrackpur, Bidyabati.North Barrackpur, Bhadreswar, Garulia, Chandannagar, Chinsura, and finally re=sC; >

Kalyani, so the river covers all most municipal area. Municipality location:-The study area of Kolkata municipality or .ves. Bengal-is bounded by 23° 00" N to 22° 27" N & 88° 18 E to 5o > - contain Olberia. Pujali. Gudgebudge.Mahishtala.HMC.kmc.Sonarpur Rajpur' Bidban nagar.South DumDum, Komarhati. Baily.Uiiarpara. NewBarr£ckpore, Madhyamgram,Barasat, Rishra, titagarh, Seramp, Bidyabati, Nortbarrackpur, Champandi,Garulia

Bhatapsr, 'Chartdannagar. Chanseria, Kanchanpara Gayeshpur and Kalyani.

V. POPULATION DENSITY MAP OF KOLKATA METROPOLITAN AREA

According to a population density map of the Kolkata metropolitan area during 1991 to 2001 area where population density in a certain range these are given below.

Kalyani,Gasypur,Barsat,Rajarhatgopalpur,Sonarajpur ,Baripur,Uluberi South DumDdum .Bidhan nagar, Pujali are re abb at 5,000 density per sq km, Where the population increase highly in Halisahar,Hooghly,Chansura,Chand NagarSerampur, Uttapara,DumDum, Madhamgram Mahistala are lies population density from 5000 to 10000,sin^'arly in Kanchan para Mahati.Bhatpara .Bhadreswar.Garulia, Champadani. North barrackpurKonnagar.Panihati reach from 10,000 to 20,000 population per sq km likely Uttarpara, Bally, Howrah , Kolkata reach the population density at 20,000 to 30,000 and only Baranagar rank at top above 30,000 population density during last decade from 1991 to2001.

According to 1991and 2001 population density map population density highly increase in Rajpur Sonnarpur Uluberia.SouthDumDum, Bally, Uttarpara,Barsat, Serampur population reach very high, so population are increase in a Geomertric progression.
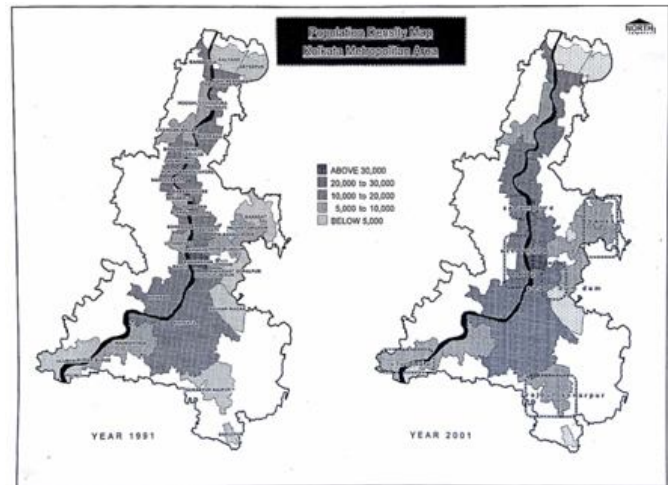
Slum population

A run down area of city or town inhabitant by very poor people, building unfit to be lived .uncomfortable condition at low social labour.According to slum population data of a given area. The r statistics of maximum 1,000,00 population are found inhabitant Howrah, Kolkata.and Uluberia and 50,000 to 100,000 slum population are found in Bhadraswar, Srirampur.Titagarh, Panihati, Baranagar, bally etc and 30,000 to 50,000 slum population are found in Kalyani.Barasat, slum population 15,000 to 30,000 are found in Bansaberia, Kanchanpara, Hoogoly, Chansura, Naihati, Garulia, Khardha.Rajahat Gopalpur, Budge Budge and below 15,000 slum populatin are in Pujali Sonarajpur. Komarhati, North Dum Dum, Madhyam gram, Gayespur, Konnagar, Kanchanpara are found.
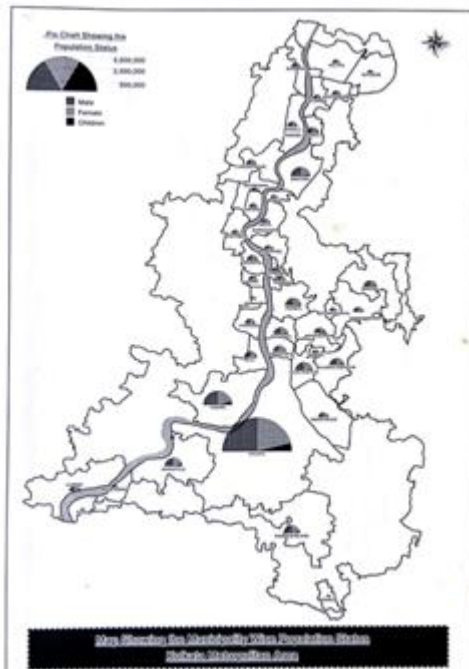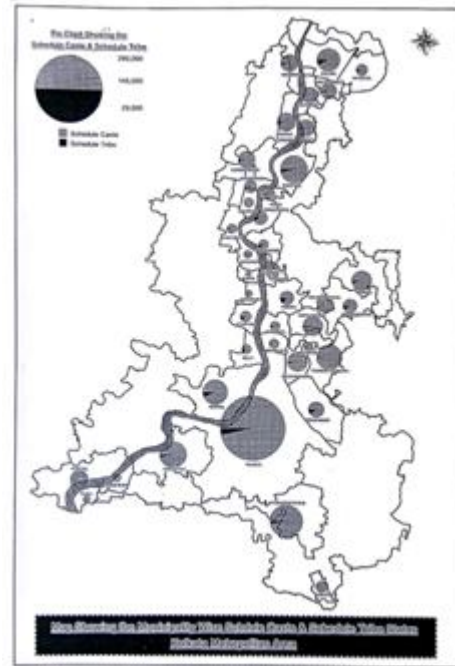
POPULATION STATUS

According to the pie-chart of population status the total number of population are 8000,000 among them 5000,000 are male and 25,00,000 are female and 500000 are children are found in Kolkata metropolitan area and their area of KMDA out of them 62. 5% is about male 31.25% is female and 6.25% are children.
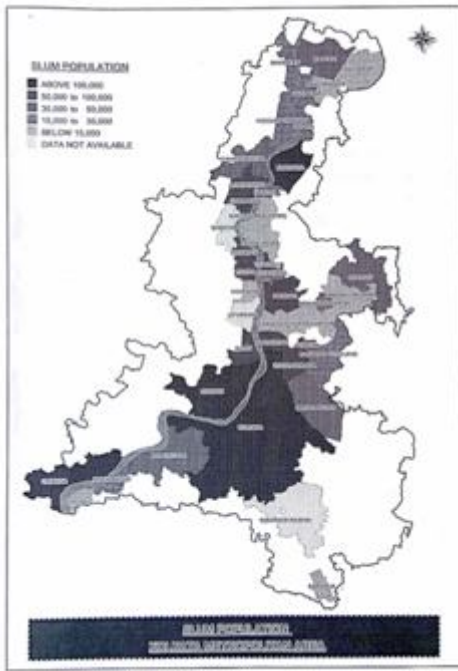
According to Pie-chart showing the schedule ast and schedule tribe Total number of schedule cast and schedu tribe is 290,000 and145,000 are found 290,000 schedule tribe e widely distributed all through the kolkata and adjacent areas. Among these p-ea Budge Budge.New Barrackpur, Konnagar.Rishrs, are only schedule cast are found and schedule tribe is not found.

All these f'..'ie-chart show that number of schedule cast are maximum and '?hedule tribe are very less among them in every ward the percen.uge of schedule cast is about 83.3% and schedule tribe is about 16.6% are furnish.

VI. WORKING DETAILS

According to KM DA data total working person is 1717734 and n Workino person is 2855142 which is highest except Kolkata area Hov.rah.The total working person is 346984 and non working parson is £60546 which is less than Kolkata area, Maheshtala South DumD'jm.Panihati & Sonarapur Rajpur.Goppalpur working person is 11S554 & non working person is 265612 but in South DumDum Working person is 145337 & non working person is 247107 in Panihati working person is 120833 & non working person is 227605*in Ragopalpur working person is 94001 & non working Person is 177810 respectively.

Only afcove written area working & non working person is very high in Comparison with other area. Among these area Kolkata & Howrah lYjno £* non working percentage reach very high,

VII. SUMMARY AND CONCLUSION

Spatial data describe the location of spatial features which may be discrete or continuous .discrete include point, line and area and continuous features are elevation and precipitation, GIS represent these spatial features on the earth surface as a map features on a plane surface these transformation involved to main'issue.

1.   Spatial reference system
2.   Data model

The location of spatial features on the earth surface are based on a Geographic co-ordinate system with latitude/longitude value, where location of map feature are based on plane co-ordinate system with (x,y) co-ordinate, projection is the process that can transform the earth spherical surface to a plane surface map layer must based on some co-ordinate system

A data model define how spatial features are represent in a GIS, vector data model uses point and there (x,y) co-ordinate to construct spatial feature of point line and area .Raster data model uses a grid and grid cell to represent the spatial variation of feature.

The two data models differ in concept vector data are ideal for representing continuous feature, they also differ in data structure the raster data model used a simple data structure, row & column pixel cell location, the vector data

model may be geo- relational based or may not involve topology & may include simple or composite feature. Arc-GIS is a power-full mapping and geographic analysis application in location intelligence, Design to easily visualize the relationship between data and geography, map info professional help business analyst .planner, GIS professional even non GIS user gain new insight into their market, show information rich map and graphics and improve strategic marketing,

Arc-GIS manage location based asserted people and property, optimize service and sale territories for greater efficiency .Deploy net work, Infrastructure and map resources, plane logistics ,and prepare for emergency with map info professional multiple data sources are accessed directly and combine in to a single view .customer data competitive municipal data or commercially provided data such as high way are looked in a big picture , if any of data change map info automatically up date to give analyst and co-worker access to give very same data So after all map info professional provides us best service for ever- to GIS analyst.

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