

Analysis of Educational Centers in North Zone of Surat City

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Abstract: The main goal of an urban planner is to plan with citizen's comfort, health, and utility in context. GIS is a tool for mapping the plans with attribute data and details. As a result, the best suitable location for any of the facility is identified. The educational centers in the study area are identified to have poor accessibility (Waleed Lagrab, 2015). The purpose of the study is to use GIS for exploring ideal locations of educational centers. In the study, an analysis of accessibility of educational centers with road network is carried out. Demographic data were used for the demand analysis. A proximity analysis using the buffer tool was applied. As a result, the study revealed about the effectiveness of analysis by using the GIS technology. Despite the area developed employing an implementation of T. P. Scheme mechanism, it was abstracted that the locations of educational centers seemed not to be planned following any guiding parameter. Also, as per demand, the existing centers are inadequate with dispersed distribution.

Keywords: Analysis, Accessibility, Educational Centers, GIS Tool, Surat

- GIS is used to resolved this problem quickly
- Many populated area needs more educational centers to serve their social needs
- It was showed that there are no using any standard criteria for distribution of educational centers

I. INTRODUCTION

GIS proves to be a very useful tool for urban analysis and evaluation of service delivery measurement (ESRI, 2016). It serves to compare between the planned and the reality for a particular area helps in identifying aligned the development of an urban area. GIS serves as a valuable tool for optimizing different public services like green spaces, educational centers and such. Educational centers are the most important social infrastructure for the citizens. Hence the government provides all levels of the educational institutes in all the habitable areas. Several parameters need consideration for planning and distribution of services. These are population, distances, type of land use, availability of vacant spaces and so on. For increasing the spread of formal education, it needs to rise the educational facilities in qualitative and quantitative aspects. Educational centers serve to help children learning ways to perform managerial and other institutional functions. An attempt here is made to identify the spread of educational facilities in the study area using GIS tools.

II. PROBLEM DEFINITION

There exist a few educational centers in the study area. A part in the study area have high population density and seldom have educational centers to cater needs of present and future education. The statement is checked using GIS Tools for the North Zone of Surat city.

III. RESEARCH HYPOTHESIS

IV. STUDY AREA

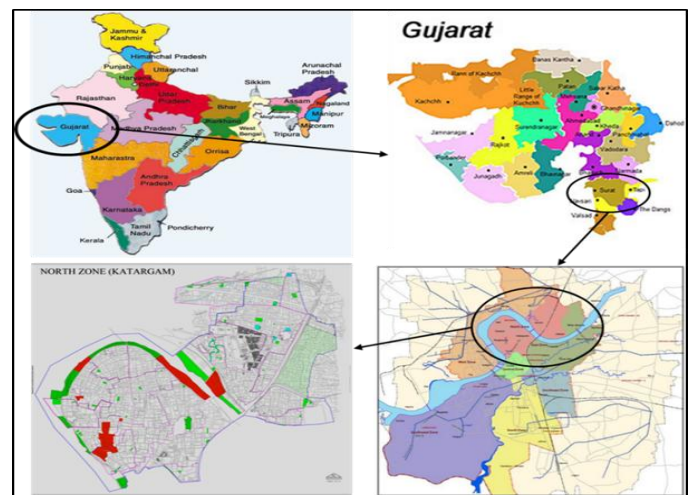


Figure 1 Location of study area

The paper discusses the study area - North Zone of Surat city. The area of North Zone is about 36.363 Sq. Km. which is 11.13% of the total area of the city. In the NZ, there are 11 administrative wards and the population is about 7,03,494 having a population density of 193.46 ppha. If urban planning is improved and city services are properly maintained, the cities continue to have a positive influence on surrounding region. In the globalizing scenario, the role of cities is even more noticeable. Commonly, the attractiveness of city as an investment destination depends upon the quality of social infrastructure, social safety, and connectivity. Improved quality of life in the city depends upon to provide necessary foundations for growth.

V. DATA COLLECTION AND ANALYSIS

Researchers performed an analysis of educational centers in the North zone of Surat city based on the methods explained in various past efforts. Spatial and non-spatial data is used for performing detailed study of these educational centers. The spatial data includes the Land use images (acquired through satellite imagery) and digitized roads maps. The non-spatial data is inclusive of the population details and educational centers.

The GIS based analysis for such pockets show the locations with better visibility (Figure-4) compared to general land use plan.

VI. DIGITIZATION OF MAP

Spatial data of land use images, road network, residential pockets, and educational pockets were digitized by using GIS tool. Figure-2 below shows the digitized road network in the North Zone. The hierarchy of roads as major roads, minor roads, and street roads are identified separately.



Figure 2 Digitization of roads and zone boundary

In the digitized map, the residential area pockets were identified separately. Below Figure-3 show the road network and the residential area in the North zone irrespective of other type of land use in surrounding.

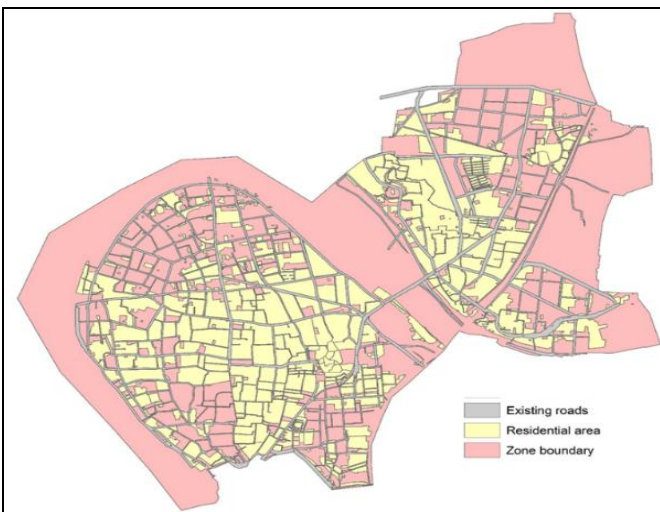


Figure 3 Digitization of residential pockets

Further addition of land pockets having educational establishments need to be identified. For the purpose, Figure-3 layer was developed as below. Prominently, the map shows the locations of the schools and colleges and its distribution as well. It is observed that the educational facility is not distributed equally however, there are many residential pockets where schools are not within walkable distances.

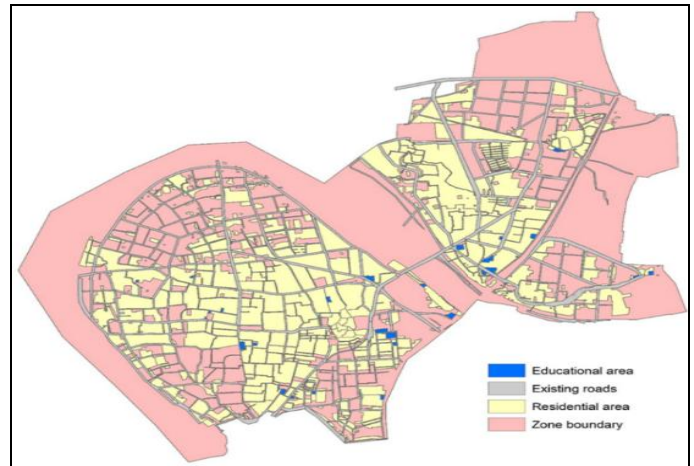


Figure 4 Digitization of educational pockets

VII.SPATIAL ANALYSIS OF EDUCATIONAL CENTERS

The study area is divided into the wards as shown in Figure-5. Different wards have variations in population density. The highest density is in Ward no. 72 (Amroli) and Ward no. 42 (Katargam) with 690.09 ppha and 469.24 ppha respectively. By using the spatial statistical tool, researchers analyzed the proximity of land use. The determination of the Mean Centers of population density and calculation for the distance from the existing educational centers (Waleed Lagrab, 2015) needs to be found while performing proximity analysis.

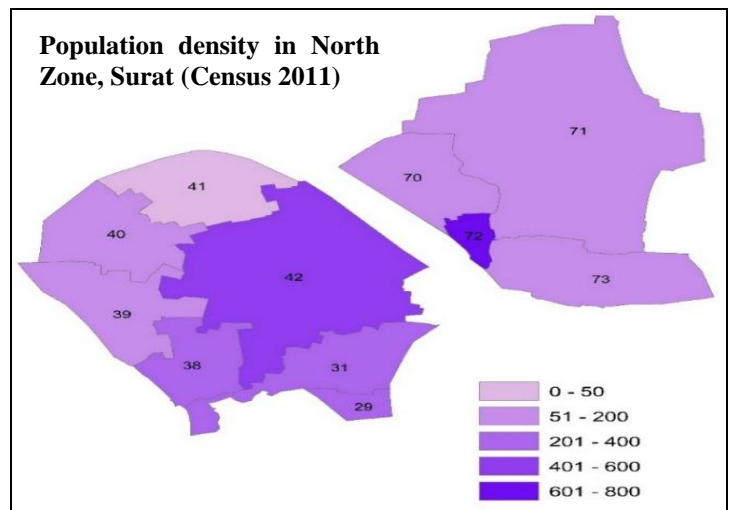


Figure 5 Ward-wise population density map

VIII. EDUCATIONAL CENTERS CAPACITY

An analysis for identifying surplus-gap in the existing educational facilities in reference to URDPFI guidelines was performed. Table-1 show that the values of facilities in each of the categories are comparatively very low and show a huge gap to match with the standards.

Table 1 Distribution of educational centers as per population according to URDPFI guidelines

Wards (Name & numbers)	Population	Existing categories & population				Needed requirement as per guidelines			
		C1	C2	C3	C4	C1	C2	C3	C4
TPS - 1 Rampura Laldarwaja/ 29	10226	-	-	-	-	4	2	1	-
TPS - 3 Katargam Gotalawadi/31	63237	1	1	1	1	24	12	7	-
Tunki/38	48038	-	-	-	-	19	10	6	-
Singanpor/39	32319	-	1	-	-	13	5	4	-
Dabholi/40	20160	-	1	1	-	8	3	1	-
Ved/41	6371	-	1	-	-	3	1	-	-
Katargam/42	328471	1	1	2	1	130	65	20	3
Chhapara Bhatha/70	46820	-	-	-	-	19	9	6	-
Kosad/71	88224	1	1	1	-	34	17	11	-
Amroli/72	28501	-	-	1	-	11	6	3	-
Utran/73	21459	2	2	1	-	2	-	2	-

In the table above, the codes used are:

- C1- Pre Primary, Nursery School-2,500 population served as per URDPFI guideline
- C2- Primary School (class I to V) – 5,000 population served as per URDPFI guideline
- C3- Senior Secondary School (VI to XII) – 7,500population served as per URDPFI guidelines
- C4- College – 1.25 lakh populations served as per URDPFI guideline

The websites of the District Education Office and Surat Municipal Corporation were extensively used to derive the number of existing facilities. No ground verification however, is performed.

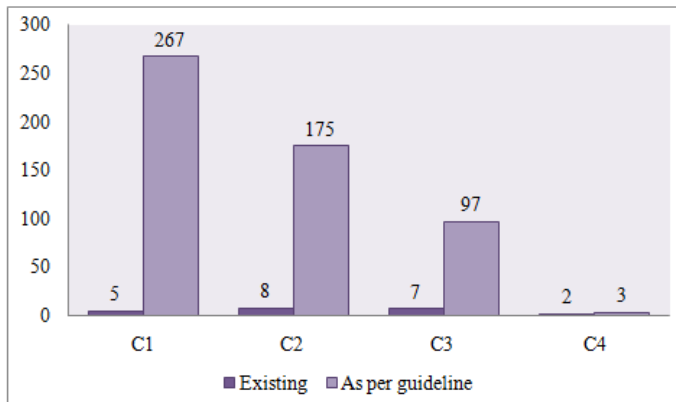


Figure 6 Analysis of educational centers

Above graph shows a visual comparison between the existing facility and underlying gap (or ideally required) for each of the category of educational facility in entire of the North Zone. To identify the gaps, a standard value in each category was obtained as per the URDPFI Guidelines. There may be some variation in the actual condition on the field concerning to the educational centers.

IX. DISTRIBUTION PATTERN

Figure-7 shows the distribution of the educational facility centers in the North Zone. These are mostly scattered and do not cover the Zone with equal distances.

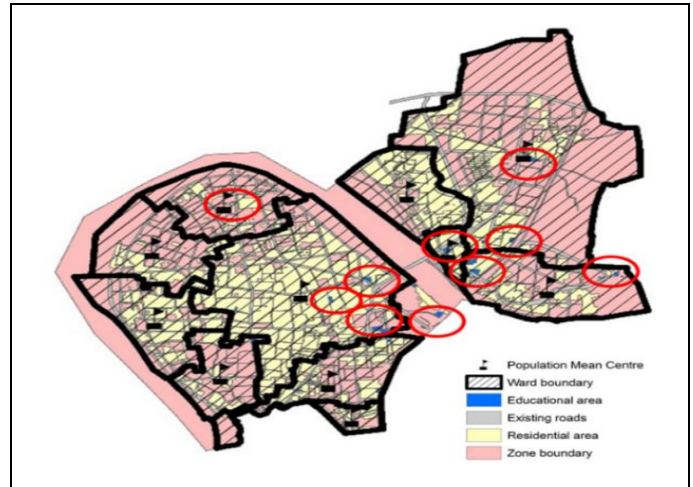


Figure 7 Population Mean Centers and existing educational centers

Mean Centre tool is used to determine the center point of population concentration and mean centers for educational centers. Figure-7 shows the distance between the population mean center and educational centers in different wards. Further analysis is carried out for the buffer rings for distances from the educational facilities to check the coverage of residential areas. Three buffer rings were made around the educational centers respectively: 50m, 100m, 150m. which shows in Figure-8; these rings decide the correct location of educational centers based on the residential area.

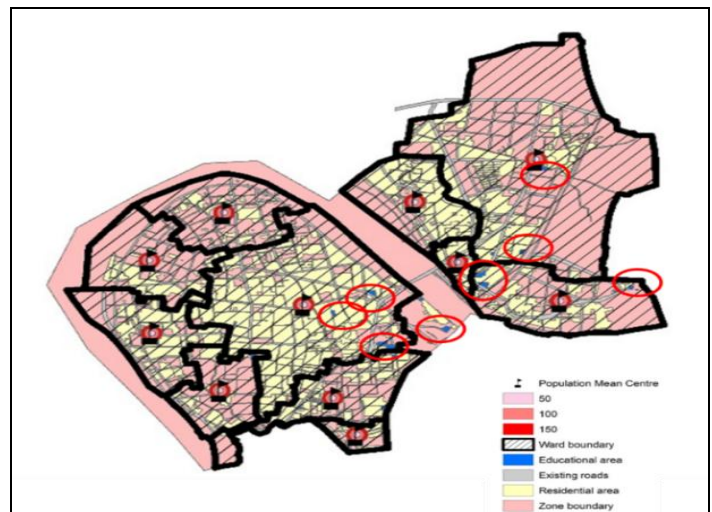


Figure 8 Educational center buffer up to 150m

X. CONCLUDING REMARKS

The study revealed that there is a considerable lack of implementation for the educational centers as per planning guidelines. GIS tools can help at large to identify the gaps in

existing facilities and aid for further reactive or proactive planning. Location of an educational facility within a buffer ring of 150m is ideal in residential area. In the North Zone of Surat city, it is concluded that the wide gaps are identified as far as the educational facilities are concerned. The gaps are not only by means of population based planning norms but also, spatially also, the existing facilities are inadequate.

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