GIS based Assessment and Gap Analysis of socio-economic Infrastructure in Rourkela Town

Debadutta Parida

BMS School of Architecture
E-mail: debadutta.parida2011@gmail.com

Abstract—*The steel town of Rourkela originated in 1960 as a new experiment in urbanism in Post-Colonial India. The present study focuses on GIS based assessment and gap analysis of socio-economic infrastructure in thirty-three wards of Rourkela Municipal area, referred to in the paper as Rourkela Town.*
1. *The study was carried out for six broad criteria viz. educational facilities, healthcare facilities, safety and security services, postal services, socio-cultural facilities and banking facilities. Altogether data was collected for identified facilities, which was later mapped using GIS tools. The data was further compared with required standards for socio-economic infrastructure as prescribed by UDPFI (Urban Development Plan Formulation and Implementation) guidelines.*

2. *Data collection has been through expert discussions, observation survey, collection of field data, secondary sources as well as satellite imagery available from various sources.*

3. *The results indicate that there is shortage of infrastructural facilities in terms of numbers (when compared with UDPFI Guidelines) as well as geographical distribution for eight of the eighteen facilities investigated. Additionally, two facilities each fell short either in required numbers or geographical distribution. Eight facilities were adequate in numbers as well as their geographical distribution.*

4. *In totality, it was inferred that there is a disparity in terms of available infrastructure as well as their distribution between the Rourkela Steel Plant area and the Municipal wards. Also, there is urgent need for augmentation of healthcare facilities in Bondamunda area.*

5. *The findings emphasize the significance of GIS mapping as a tool to assess the distribution pattern of infrastructure in an area. The findings have potential implications for all planning agencies in the town to develop strategies for augmentation of open spaces in the study area.*

Keywords: *GIS based assessment, Socio-economic infrastructure, UDPFI Guidelines, Rourkela Town, Gap Analysis*

1. INTRODUCTION

The industrial town of Rourkela was set up in the 1950s along with its counterparts such as Bhilai, Durgapur and Bokaro, as a result of Central government policies towards industrialization of the country. Unlike colonial urban forms, it did not represent juxtaposition of traditional urban core with modern planning approaches. It was rather built from scratch. The initial planning of the town was conceived in totality, with a clear segregation between the steel township, the resettlement colonies and the steel plant. Recent developments in the last three decades however have been incremental in nature as a response to socio-economic and cultural changes in the town. The town has grown from a village to a steel town into an urban agglomeration in recent times. The population of Rourkela has grown from 90, 287 in 1961 to 5,52,239 in 2011(Parida, 2014a). The Urban Agglomeration is broadly divided into Steel.

Township and Civil Township area. This study focuses on the thirty-three wards in the Civil Township under the control of Rourkela Municipal Corporation, henceforth referred to as Rourkela Town. The population of Rourkela Town was 2, 73,040 in 2011 and is forecasted to increase to 3, 78,479 in the year 2031.

The development of the town in the 1970s and 1980s was often hampered by a 'one-sized-fits-all' mentality, prescribing reforms from a centralized perspective, without regards for the territorially specific needs of a given population or community(De, 2003). However, it is to understand that any single aspect of a town (cultural heritage, economy, infrastructure, environment etc.) cannot exist in isolation without being influenced by one another. An integrated approach is therefore necessary at local levels which makes these aspects of the city 'interact' with each other and develop in tandem.(Parida, 2014b). In this context, Rourkela Town can be considered as a system in which there are several sub systems which are inter dependent as well as closely linked. The various subsystems can be physical, socio-economic, environment and ecology, infrastructural(transport, social and economic), institutional, disaster related etc.(Parida, 2014b). The present investigation focuses on the existing situation of socio-economic infrastructure in Rourkela Town.

2. KEY ISSUES IN THE STUDY AREA

Some of the key issues in Rourkela Town are as follows:

1. There is severe dichotomy in the infrastructure levels between the areas under Rourkela Municipal Corporation and Rourkela Steel Plant.

2. Nearly 43% of the population of Rourkela Town is in slums and squatter settlements. This number is expected to increase as the town grows towards an urban agglomeration.

3. The current draft master plan prepared for the town lacks intent due to lack of integrated planning. There is not much focus on correcting various weaknesses of the town in terms of augmenting the economic as well as social subsystems.

4. The quality of open spaces, socio-cultural spaces, postal services, safety and security services in the town are below acceptable standards.

5. There is lack of proper spatial data for the town presently.

3. METHODOLOGY

After the identification of issues in the study area, the investigation focused on identifying parameters relevant to social infrastructure. Six broad categories were identified through expert discussions and survey in the area. Data was collected and mapping of facilities was done for eighteen tangible facilities under the six criteria for further analysis and assessment. Gap analysis of the existing data was done through comparison with the acceptable standards as per UDPFI Guidelines. The two criteria for analysis were quantity of service provided and distribution of services. Broad inferences were then drawn from the investigation.

Broad categories – Educational facilities, Healthcare facilities, Safety and Security services, Postal Services, Socio-cultural facilities and Banking facilities

Facilities studied: Secondary School, Library, College, Polyclinic, Intermediate Hospital, General Hospital, Police Station, Fire Station, Post Office, Community Halls, Clubs, Cultural center, Theatre, Spiritual Center, Music/Dance School, Cremation/Burial grounds, Sports grounds/stadium, Open spaces and parks and banks.

4. RESULTS AND DISCUSSION

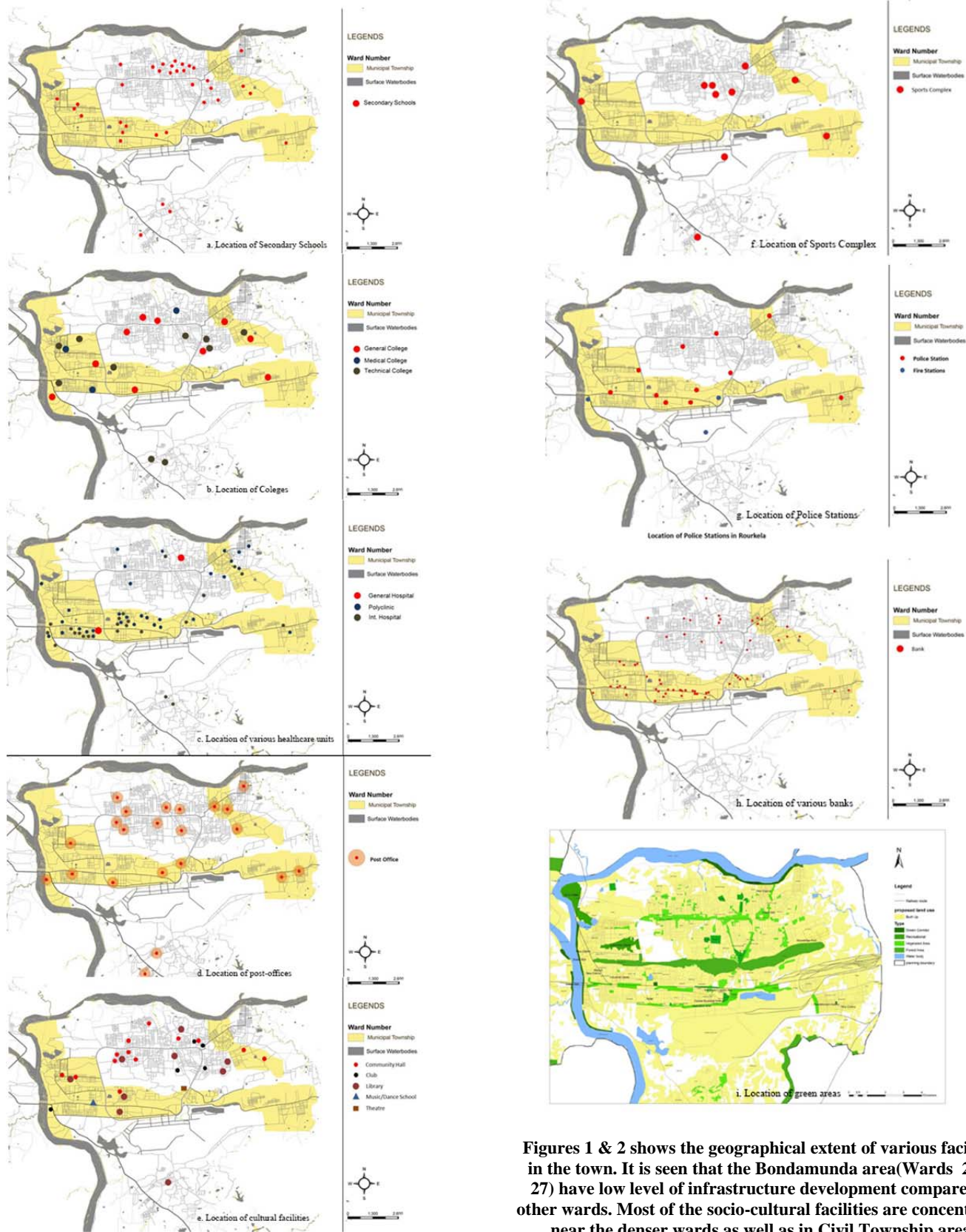**Table 1 shows the comparison of all of the above facilities with the required standards of UDPFI Standards.**

Sl. No.	Facility	Required*	Existing	Shortage	Remarks
1	Sec. school	55	11	44	US
2	Library	18	03	15	US
3	College	37	14	24	US
4	Intermediate Hospital	08	27	-	S
5	Polyclinic	07	23	-	S
6	General Hospital	03	03	-	S
7	Police Station	02	02	-	S
8	Fire Station	02	02	-	S
9	Post Office	18	11	7	US
10	Community hall	18	03	15	US
11	Club	03	01	02	US
12	Cultural Center	03	00	03	US
13	Spiritual center	03	00	03	US
14	Music School	03	01	02	US
15	Cremation/burial ground	03	09	-	S
16	Stadiums	01	10	-	S
17	Parks and playgrounds	28	13	21	US
18	Banks	-	50	-	S

The calculations have been made according to the population of 2,73,040 of Rourkela Town according to Census of India 2011

US – Unsatisfactory, S - Satisfactory

Table 1 Comparison of facilities with UDPFI Standards

It was seen that ten of the eighteen facilities did not meet the required standards corresponding the population of the town. It is observed that the healthcare facilities were adequate in the town area. Also, there is adequate provision in terms of sports complexes as well as banking facilities. However, it was yet to be checked if their geographical distribution in the study area was adequate. Hence it was inferred that a GIS-based assessment was necessary to show the extent of physical coverage of each of the facilities in the town.

a. Location of Secondary Schools

b. Location of Coleges

c. Location of various healthcare units

d. Location of post-offices

e. Location of cultural facilities

f. Location of Sports Complex

g. Location of Police Stations

Location of Police Stations in Rourkela

h. Location of various banks

i. Location of green areas

Figures 1 & 2 shows the geographical extent of various facilities in the town. It is seen that the Bondamunda area(Wards 23 to 27) have low level of infrastructure development compared to other wards. Most of the socio-cultural facilities are concentrated near the denser wards as well as in Civil Township area.

Majority of the wards do not have easy access to educational facilities. The students have to rely on schools in the Rourkela Steel Plant area, which increases the distances to educational facilities. There is also need for augmentation of healthcare facilities in Bondamunda. Also, there is urgent need to develop and maintain more parks and playgrounds in the study area, since majority of the parks currently are in Civil Township.

5. CONCLUSION

Table 2 below shows the overall performance of all the facilities in terms of quantity and geographical distribution.

Table 2(a to i): Mapping of various facilities of socio-economic system in Rourkela Town

Sl. No.	Facility	Quantity (a)	Distribution(b)	Overall rating(a+b)
1	Sec. school	0	0	0
2	Library	0	0	0
3	College	0	1	1
4	Intermediate Hospital	1	1	2
5	Polyclinic	1	1	2
6	General Hospital	1	1	2
7	Police Station	1	1	2
8	Fire Station	1	1	2
9	Post Office	0	1	1
10	Community hall	0	0	0
11	Club	0	0	0
12	Cultural Center	0	0	0
13	Spiritual center	0	0	0
14	Music School	0	0	0
15	Cremation/burial ground	1	1	2
16	Stadiums	1	1	2
17	Parks and playgrounds	0	0	0
18	Banks	1	1	2

Eight of the eighteen facilities studied are unsatisfactory both in terms of quantity as well as geographical distribution, while eight facilities are satisfactory both in quantity as well as geographical distribution. Only two facilities are satisfactory either in quantity or in distribution.

It is inferred that there is shortage of facilities such as secondary schools, library, post offices, parks and playgrounds in Rourkela Town. For other facilities such as community halls, clubs, theatres and cultural centers, the residents rely on the facilities available in the Rourkela Steel Plant area.

There is urgent need of augmentation with logical distribution of open spaces (parks and playgrounds) in the study area. In recent times, proposals for seven new parks have been initiated in Civil Township, Basanti Colony, Koel Nagar and Chhend Colony, which is encouraging. Yet, there is immense disparity that exists in terms of per capita open spaces in the Steel Plant area and Rourkela Town.

6. DIRECTIONS FOR FURTHER RESEARCH

The study recommends ward level GIS based analysis and assessment of various parameters for the urban agglomeration. There is also potential for quantitative studies of assessment of per capita open space in all the wards in the study area. Recently, Rourkela Urban agglomeration was ranked 46th among the list of 97 cities released by the Government of India in 2016(Smart City Report, 2016). This is expected to give rise to opportunities for improvement of the facilities which are currently in neglect due to various reasons. Future studies can be carried out using similar methodology and approach for other subsystems (as mentioned earlier in this paper) such as transport, social quality of life, economy etc.

7. ACKNOWLEDGEMENTS

REFERENCES

[1] Dara, P.K, Singh, D.K., & Rout, P. . (1997). Role of Environmental Degradation in Changing the Urban Morphology: A Case Study of Rourkela in Orissa. In *Geography and Environment* (pp. 224–234). Retrieved from http://books.google.de/books?id=JuxzP-YSddMC&pg=PA223&lpg=PA223&dq=rourkela+town+ecological+study&source=bl&ots=Fgq9GQ8mCD&sig=i2ifOEnjXaSX2LJ0LuNjOLULagE&hl=en&sa=X&ei=V1sHU_vYAYig7AaWlICgDQ&ved=0CF8Q6AEwBg#v=onepage&q=rourkela town ecological study&f=false

[2] De, J. A. (2003). An Integrated Approach to Rural Development : Dialogues at the Economic and Social Council. *United Nations Publication*, 10–17.

[3] Koroneos, C. J., & Rokos, D. (2012). Sustainable and Integrated Development—A Critical Analysis. *Sustainability*, *4*(12), 141–153. https://doi.org/10.3390/su4010141

[4] Municipality, R. (2011). *City Sanitation Plan Draft Report October 2011*.

[5] Parida, D. (2014a). *Planning for Integrated Development of Rourkela Town*. IIT Roorkee.

[6] Parida, D. (2014b). *Planning for Integrated Development of Rourkela Town*.

[7] Parida, D., & Devadas, V. (2014). Qualitative assessment of performance of ULBs in Rourkela Town. *International Journal of Research*, *1*(5), 435–442. Retrieved from http://edupediapublications.org/journals/index.php/ijr/article/view/178

[8]   Rourkela Development Authority Webpage. (2017). Retrieved from http://rdarourkela.in/

[9]   Rourkela Municipal Corporation Webpage. (2017). Retrieved from http://rmc.nic.in/index.html

[10] Roy, S. (2007). *Urban Imageries : Locating the Modern City*. (T. Çınar, Alev and Bender, Ed.).

[11] Sinha, A., & Singh, J. (2011). Jamshedpur: Planning an Ideal Steel City in India. *Journal of Planning History*, *10*(4), 263–281. https://doi.org/10.1177/1538513211420367

[12] Smart City Report. (2016). Ranking_of_Smart Cities.pdf. Retrieved from http://smartcities.gov.in/upload/582d8612850c7Ranking_of_Smart Cities.pdf