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Problems and prospects of sustainable smart cities: A case study of Ranchi

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Abstract
Cities are pivotal to India's growth and economic development. However, the rapid horizontal and vertical expansion in what many call the "messy and hidden" process of urbanisation compels scholars and policymakers to look for concrete solutions to the various problems brought about by urbanisation. This paper is the case of the city of Ranchi, the administrative capital of Jharkhand, one of the cities selected under the Government of India's 'Smart Cities Mission' (SCM). The report provides an overview of Ranchi and evaluates the city vis-a-vis the vital dimensions of a 'smart city'. It discusses the challenges in developing Ranchi into a smart city and the initiatives by the state government to make the city vibrant, viable, habitable, inclusive and sustainable. The study concludes with policy prescriptions that should facilitate Ranchi's transformation into an inclusive and sustainable smart city.

Keywords: expansion, urbanization, dimension, vibrant, transformation

Introduction

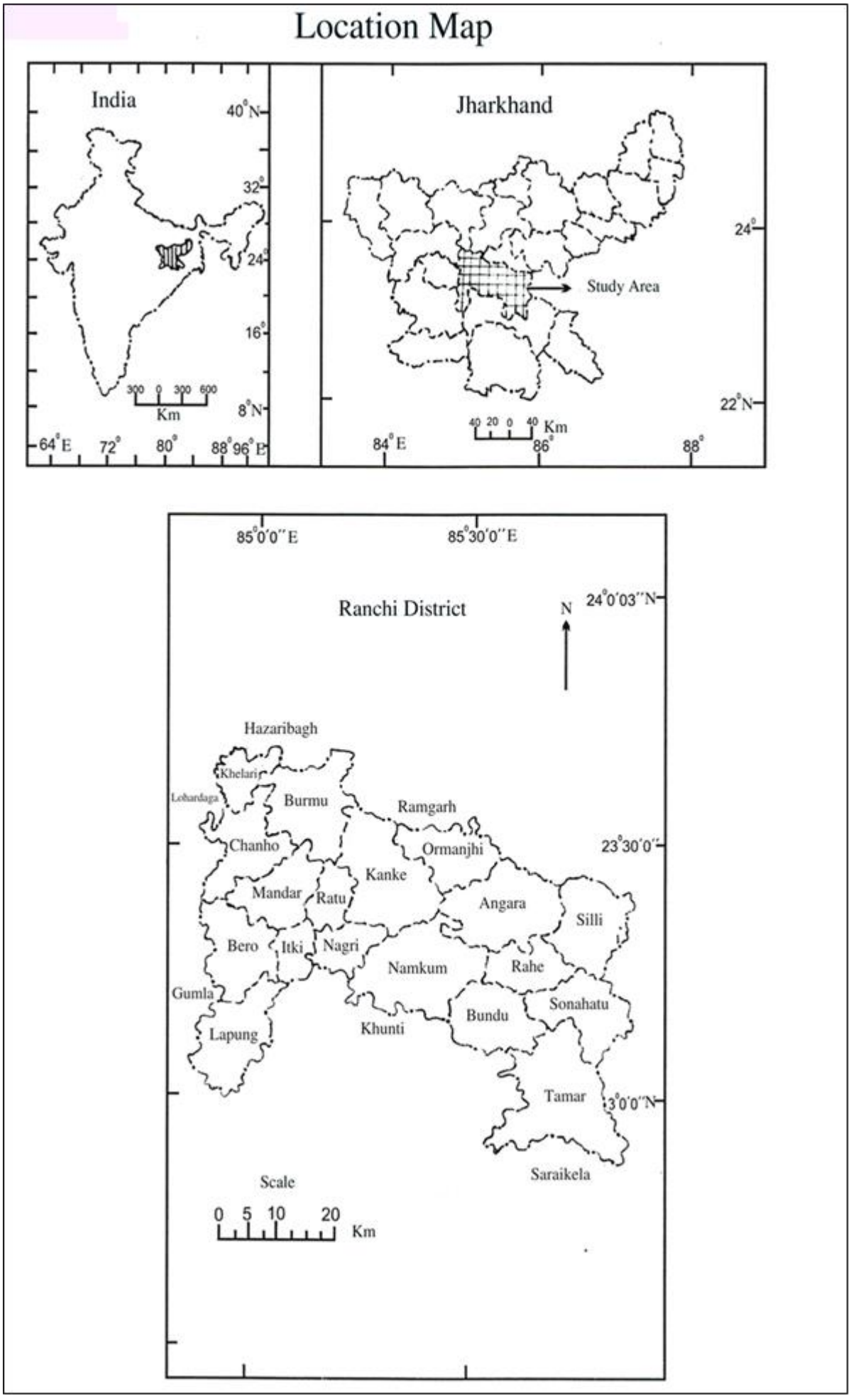
The term "sustainable" was brought into common use by the World Commission on Environment and Development in its 1987 report "Our Common Future". The idea of sustaining the earth has proved a powerful metaphor in raising public awareness and focusing on the need for better environment stewardship. The Brundtland commission's definition of the term meeting the needs of the present generation without compromising needs of future generation- is strongly endorsed by this report. With the Brundtland commission, that meeting the needs of the poor in this generation is an essential aspect of sustainably meeting the needs of subsequent generations. There is no difference between the goals of development policy and appropriate protection. Both must be designed to improve welfare. Making the concept of sustainability precise, however, has proved difficult. It is not plausible to argue that all natural resources should be preserved. Successful development will inevitably involve some amount of land clearing, river damming and swamp draining. Some have argued that natural capital should be preserved in some aggregate sense, with losses in one area replenished elsewhere. This approach has helpfully focused attention on the need to estimate the value of environmental resources and on the importance of protecting certain essential ecological systems. (Salpekar and Sharma, 2007) [1]. In the year 1949, the United Nations determined that the World Town Planning Day would be commemorated every 8th November, in order to acknowledge and promote the role of planning in creating sustainable communities. On that very date, the world rural population surpassed the world urban population. However, the 21st century is becoming known as the century of cities.

According to the United Nations, already in July 2007, the urban population surpassed the rural population in the world. Moreover, this proportion is expected to increase dramatically in the coming years to the point that by 2050, almost 70% of the world population will be living in the cities and India is no exception. Currently, 31% of the Indian population stays in the cities and contributes about 65% to the national GDP. (World Bank Data)

Without a doubt, the increase in Urbanization exerts immense pressure on the existing infrastructure, food supplies, water supplies, traffic management, waste disposal systems, sustainability and on the overall quality of life. There has to be a simultaneous development in the technological frontier of the cities in order to accommodate the agglomerations. Hence, it is imperative for the government to introduce technology and build smarter solutions to solve these problems. With this increasing urbanization and load on cities, the government has realized the need for cities that can cope with the challenges of urban living and also be magnets for investment. Thus, the idea of "smart cities" came into formulation.

Study area

Ranchi is located in central part of Jharkhand state, extending 22°54 'N- 23°43' N latitudes and 84°52' E- 85°54' E longitudes. It extended over 5087 square kilometer. It is bounded on the north by districts of Hazaribag and Ramgarh, on the south by the district of Khunti, on the east by West Bengal and on the west by the districts of Lohardaga and Gumla. According to 2011 census, the total population is 2914253, where males and females are 1494937 and 1419316 respectively.


Location Map
India
40°N
32°
24°
16°
8°N
64°E
72°
80°
88°
96°E
300 0 300 600
Km
Jharkhand
24°
22°N
84°E
86°
88°
Study Area
40 20 0 40 Km
85°0′0″E
85°30′0″E
Ranchi District
N
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Hazaribagh
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Ramgarh
Chanho
Ormanjhi
Kanke
Mandar
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Angara
Silli
Bero
Itki
Nagri
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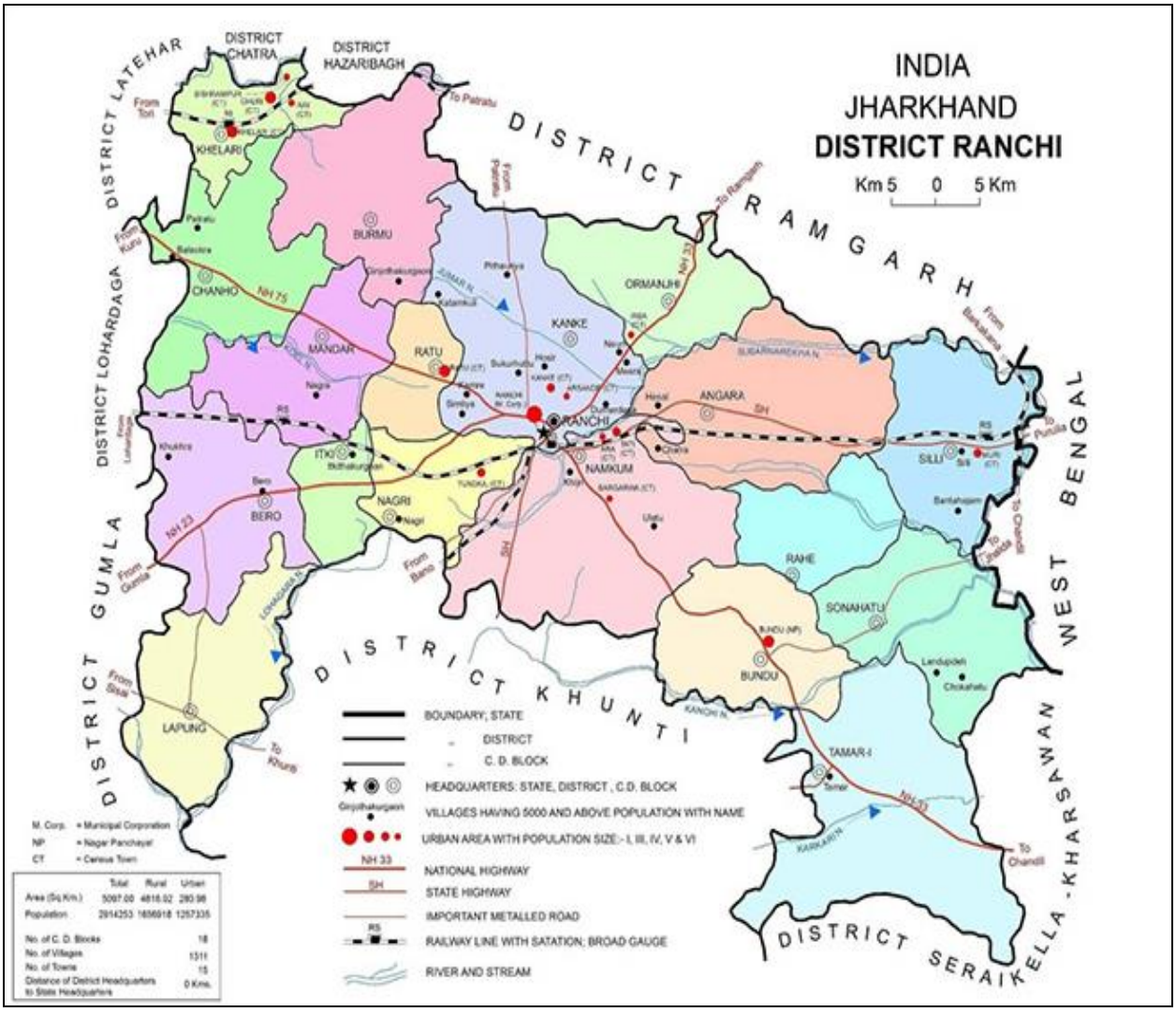

Fig 1: Administrative Map of Ranchi

The total area of Ranchi's Urban Agglomeration is 197.36 sq. km, which includes the Ranchi Municipal Corporation (RMC), Kanke Census Town (CT), Arsande CT, Ara CT, Bargarwa CT and Tundiul CT. The total area of the RMC is 175.12 sq. km, with a population of 1.07 million and a population density of 6,129 persons/sq. km. The RMC was established as an Urban Local Body (ULB) on 15 September 1979. Currently, Ranchi is a million-plus city. It has one circle office and 55 administrative wards. While earlier, there were 37 wards (Ranchi: 1–24 and Doranda: 25–37), now, there are 55 wards (Ranchi: 1–38, 48, 49 and Doranda: 39–47 and 50–55). Additionally, the city has a floating population of over 60,000.

Objectives

- To analyze to Sustainable smart city.
- Assessment the problems of the Ranchi Smart city
- To bring forward to planning of Ranchi Smart city.

Methodology

The present study is based on primary and secondary data. Field was visited and got to know the few problems of Ranchi smart city. During this observation author found the loop holes. Then studied the problems and its loop holes from previous literatures. Information and data collection was done. The data comprised of print form. The collected data have been processed by analytical and simple statistically form. Then data was formulated in descriptive form including tables, diagrams and maps. Further discussion and planning has been done for the betterment of Ranchi smart city.

Discussion

The concept of smart cities originated at the time when the entire world was facing one of the most worst economic crises. In 2008, IBM (International Banking Machines Corporation), American multinational technology company, began to work on a "smarter cities" concept. There are some successful smart cities in other countries such as Amsterdam, Barcelona, and Stockholm etc. There is no universally accepted definition of a smart city and it may mean different things to different people. The concept of a smart city can vary from people to people, city to city and country to country. Basically, the concept of smart cities is to use digital technology to make a city more efficient and sustainable. The term encompasses a vision of an urban space that is ecologically friendly, technologically integrated and meticulously planned, with a particular reliance on the use of information technology to improve efficiency. According to Frost and Sullivan (2003), smart cities include smart Governance and smart education, smart healthcare, smart building, smart mobility, smart infrastructure, smart technology, smart energy and smart citizen.

The concept of smart cities in India are expected to attract investments, building cities that work well especially for business and developing new technologies for communication. Digital India has a plan to build 100 smart cities across the country. Digital India envisages making India a leader in digitally delivering services in health, education, banking sectors.

Ranchi was selected as one of the 13 fast-track cities in 2016. The Ranchi Smart City Corporation Limited, a special purpose vehicle, was incorporated on 30 September 2016, by the Urban Development and Housing Department, Government of Jharkhand, to execute Ranchi's smart city projects. The two consultants working for the RSCCL are Tracte Bel and KPMG. The RSCCL will plan, design, develop, implement, manage, maintain, operate and monitor the smart city development projects for the city. It also plans to build and transfer resources in the form of financial and physical assets, based on the Build-Operate-Transfer Model. The goal is to make the city a knowledge hub for educational excellence along with an efficiently managed traffic and transportation system-based city aided by information technology. The development of the Ranchi Smart City will rely primarily on the area-based development of 656.30 acres, catering to a design population of 1.50 lakh approximately, including the floating population. It will be a Greenfield development within the municipal core of the Ranchi Municipal Corporation.

In developing the greenfield site, infrastructure projects will be taken up: land development/site clearance, transportation and circulation, open spaces and parks, water supply, waste-water management, storm-water drainage, solid-waste management, power-distribution network, solar-power generation, safety and security, transit hubs, EWS housing, social infrastructure, riverfront development and bus rapid transit system.

Some important projects currently being implemented under ABD are:

1. An Urban Civic Tower, with a built-up area of 45,469 sq. m, including basements;
2. A Convention Centre, with a built-up area of 72,523 sq. m, including basements; and
3. The Jharkhand Urban Planning and Management Institute, with a built-up area of 30,230 sq. m.

For the implementation of the smart city project in Ranchi, the city will receive funding from the central government as well as the state government: INR 500 crores each, over the mission period of five years. A convergence of projects is also planned, to source funding from other flagship projects such as AMUT, the Swachh Bharat Mission and the Pradhan Mantri Awas Yojna. The state government has also promised additional funding support by raising finances through the public-private-partnership model. The total cost of the projects planned under the smart city project is estimated to be INR 4,000 crores.

Problems of Ranchi smart city

Urban Economy

Ranchi is one of the most important urban economic centres in Jharkhand and has been instrumental in generating revenue for the state. Jharkhand's net state domestic product at the compound growth annual rate for financial year (FY) 2017–18 was 11.12 percent, increasing at an average rate of 10.81 percent since FY 2011–12. The urban areas of Jharkhand were the biggest contributors to the overall growth in the state's GDP, and Ranchi was at the top.

Ranchi has not only experienced industrialisation but also become a major business hub in the region, as well as the centre of a booming multi brand retail sector. In July 2018, Jharkhand was ranked fourth in "ease of doing business" amongst all other Indian states, by the World Bank and the Department of Industrial Policy and Promotion. However, land acquisition has been a challenge in the city, slowing down the pace of industrial development and the creation of jobs in this sector. Consequently, a large part of the population remains agrarian.

About 22 percent of the total workforce of Ranchi is engaged in wholesale and retail trade, and 19 percent in manufacturing and repairs. According to Census 2011, 0.34 million people in Ranchi (31.3 percent of total population of 1.07 million) were workers or engaged in some business activity. Of the total working population, 85.3 percent and 14.7 percent were engaged in main and marginal work respectively. About 47.5 percent of the total working population is male (0.56 million) and 13.8 percent is female (0.07 million). With the increase in economic opportunities, the city has gathered a huge floating population of migrant workers from other districts and states. Thus, Ranchi needs a sustainable urban economy that can use its rising population as an asset for long-term sustenance.

Built Environment and Human Settlements

Given its rapid industrialisation, Ranchi has spread outward along radial corridors such as Kanke Road (NH 23), Ratu Road (NH 75) and the Dhurwa–HEC Road. Between these main corridors, the lack of a complete road network has prevented growth (International Transport and Development Policy, 2012). Figure 3 shows the major land-use settlements in the city, which continues to expand both vertically and horizontally, resulting in densification of built environment and population.

There is stark spatial inequality in Ranchi. Neighbourhoods with high So L are mostly clustered in the central and north-western part of the city, while large peripheries are relatively impoverished. According to the Ranchi Smart City Proposal (SCP), the urban poor constitute 30 percent of the population. There are a number of informal settlements, including slums and squatter settlements, in the city, which suggests a lack of basic amenities and adequate housing for the poor.

Resource Management

Due to flourishing urbanisation, Ranchi faces the challenges of deforestation, rising pollution levels and depleting groundwater. Management of solid and liquid wastes remains a challenge. The sustainable development of the city demands the harnessing of non-conventional energy sources and a focus on strengthening the natural environment.

The densification of the built environment and the expansion of urbanisation—requiring the construction of new housing units-has led to the extinction of numerous water bodies (roughly 300), such as lakes and river streams and serious groundwater depletion. Water insecurity becomes acute during summers (lack of water, depletion of water table) and in the rainy season (flooding and contamination). According to the Ranchi SCM, the city has

a cumulative dam capacity of 417 million litres of water per day (MLD). As per the RMC, in 2016, the average per-capita supply of water was 98 litres per capita per day (LPCD), as against Ministry of Urban Development's recommended benchmark of 135 LPCD. In addition to inadequate supply, poor water quality plagues the city. The RMC (2016) mentioned an improvement in the water-connection application and water-tax collection with the online mechanism, improving the collection efficiency to 30 percent for water-related charges.

While the availability of electricity has improved, challenges remain, such as frequent power outages and transmission and distribution losses. The state has an installed capacity of 3049 MW. Ranchi has a solar index of 300 days of clear sun, which provides an opportunity to harness solar energy. Under the Jharkhand State Solar Policy, 2015, the Jharkhand Renewable Energy Development Agency has prepared a framework for a State Rooftop Solar Power Policy, 2018. The objective is to produce 500 MW of power through grid-connected rooftop solar plants by 2022 in Ranchi and Jamshedpur.

In sanitation, there has been an improvement in the last few years. The Swachh Sarvekshan, 2018, released by the Union Ministry of Housing and Urban Affairs (Mo HUA), national rank of Ranchi was 21 amongst 471 cities. Ranchi was also awarded the best city in citizens' feedback amongst state capitals. As per the RMC (2016), the city generates 580 MT of solid waste per day, of which around three-fourth is domestic waste. In the last few years, door-to-door collection has reached over 60 percent of the households as a result of staff recruitment. The city aims for 100 percent door-to-door collection, proper segregation and disposal and the installation, operations and maintenance of an 11 MW waste-to-energy plant.

Other than MECON, HEC (selected areas) and a few industrial regions, the sewerage system in the city is in poor shape. Most of the households are connected to septic tanks or soak pits, which are cleaned and maintained at intervals. The total sewage generated in the city is approximately 150 MLD. Despite past efforts to improve the sewerage system in the city, the wastewater or sewage from overflowing septic tanks and unconnected households flows into open drains, open *nallah*s (water channels) or nearby water bodies. The sewage gets accumulated in low-lying areas of the city due to the undulating terrain, resulting in unhygienic and unsanitary conditions. This has not only led to severe land and water pollution but also affects the quality of life of the citizens.

Ranchi also lacks a proper drainage facility for storm water disposal and treatment. Under the Service-Level Improvement Plan in AMRUT, the RMC planned to undertake a number of sewerage projects beginning 2016, for which a total outlay of INR 833 crores was outlined. When these projects are completed, the network will cover 100 percent of the total area of the city.

Finally, Ranchi is beleaguered with worsening air quality, due to increase in vehicles, construction activities and dust pollution. The Jharkhand State Pollution Control Board has acknowledged the hazardous levels (greater than 401 ppm) of air pollution and called for immediate action.

Mobility

Ranchi currently faces acute public-transport deficiencies. There are 65 buses carrying around 22,000 passengers daily, which is only five percent of the modal share. Around 155 km (6 percent) of the major arterial roads have been strengthened and widened. The construction of the Outer Ring Road (jointly under the state government and the National Highways Authority of India) is underway. For intra-city mobility, the major transport options are private shared autos, taxis, cycle rickshaws and e-rickshaws, due to the absence of adequate public transport. A flagship system dedicated to women passengers employs "pink autos" (a total of 125) which ply in different parts of the city and are driven by women.

Prospects of Ranchi smart city

The RMC struggles with numerous challenges, including unorganised spatial development, informal settlements, weak civic and basic infrastructure, service arrangement issues, municipal staff crunch, poor municipal revenue collection efficiency, issues pertaining to the CNT Act, inadequate public transport system, and lack of access to housing and education. Additionally, Jharkhand is perceived to be a Naxal-infested state, which alienates investors, tourists and businesses, thus exacerbating Ranchi's development challenges. Other obstacles include complex urban governance, including coordination with various stakeholders (e.g. Drinking Water Supply and Sewerage Department), Public Works Department and RRDA.

However, the RMC and the Jharkhand state government have taken several measures to improve the various aspects of governance, e.g. e-governance initiatives (with the use of ICT for easy access to online applications such as property-tax assessment, payment of municipal licence fees, water charges, water connections and auto-DCR for automatic scrutiny of building plans and building plans approval management system) for enhancing efficiency and transparency; developing the 'core capital area' and the Ranchi smart city in the HECL area; increasing economic opportunities and improving business ecosystems; approving Master Plan-2037 for planned development; legislations such as the Jharkhand Municipal Development Act, 2011 (amended in 2018), the Jharkhand Unified Building Byelaws, 2016 (amended in 2017), the Affordable Housing Policy, 2016 (amended in 2018), and the Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement (Jharkhand Amendment) Act, 2017; establishing specialised institutions and organising thematic interventions to improve infrastructure and support from multilateral agencies. Ranchi ranks 68th out of 111 cities in the 2018 Mo HUA's Ease of Living Index. It measures four pillars: institutional, social, economic and physical.

Conclusion

Ranchi, a small town established in the 1960s, has grown into a city of a million-plus population in the past two decades. Under the government's Smart Cities Mission, the city has opted for Greenfield development (city extension) under the ABD component and RITTS under the pan-city smart-solution component.

There is no uniform model for smart city development, and each city must leverage its unique characteristics. Therefore, the Ranchi smart city must be indigenously rooted, and the development agenda must be tailored according to the city's requirements. A smart and empowered RMC must be encouraged to function responsibly in helping urban India

achieve the goals of the SCM in a holistic manner and to establish Ranchi as a responsive, inclusive, transparent and sustainable smart city.

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