

A study of Baramati city (Maharashtra, India) for the potential to be a Smart City: Opportunities and Suggestions

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Abstract: The 2011 Indian Census found nearly 31% of India's vast population lives within urban centers and contribute a handsome 63% toward India's Gross Domestic Product (GDP). It is expected that by 2030, the population will rise up to 40% and GDP 75%. Without a shred of doubt, India's cities are its chief catalyst towards economic prosperity. The term "smart city" was coined towards the end of the 20th century and it implies the implementation of user-friendly information and communication technologies developed by major industries for urban spaces. Its meaning has since been expanded to relate to the future of cities and their development. Smart cities are forward-looking, progressive and resource-efficient while providing at the same time a high quality of life. They promote social and technological innovations and link existing infrastructures. They incorporate new energy, traffic and transport concepts that go easy on the environment. Their focus is on new forms of governance and public participation. The present study analyses the facilities available in Baramati and explores its potential to become a Smart City.

Key Words: Smart city, Baramati city.

1. INTRODUCTION:

India is a country with a rich past of cities rising to prominence and taking their place in the pages of history. It is the birthplace of major world religions, art and culture. Many cities served political, social and economic ends. Historically and presently the direction of great cities is guided, in principal, by the political establishment and further galvanized by its citizens. The 2011 Indian Census found that nearly 31% of India's vast population lived within urban centers and contributed a handsome 63% toward India's Gross Domestic Product (GDP). By 2030, we can expect the figures to rise 40% and 75% respectively. Without a shred of doubt, India's cities are its chief catalyst towards economic prosperity.

United Nation Organization says "A smart sustainable city is an innovative city that uses information and communication technologies (ICTs) and other means to improve quality of life, efficiency of urban operation and services, and competitiveness, while ensuring that it meets the needs of present and future generations with respect to economic, social and environmental aspects as well as cultural." (FICCI, Maharashtra State Council Report, 2016). "The rudiments of what constitutes a Smart Sustainable City which we define as a city in which ICT is merged with traditional infrastructures, coordinated and integrated using new digital technologies" (Batty, et.al, 2012). A Smarter City uses technology to transform its core systems and optimize finite resources. At the highest levels of maturity, a Smarter City is a knowledge-based system that provides real-time insights to take holders, as well as enabling decision makers to proactively manage the city's subsystems. Effective information management is at the heart of this capability, and integration and analytics are the key enablers. (IBM, 2013) The term "smart city" was coined towards the end of the 20th century. It is rooted in the implementation of user-friendly information and communication technologies developed by major industries for urban spaces. Its meaning has since been expanded to relate to the future of cities and their development. Smart cities are forward-looking, progressive and resource-efficient while providing at the same time a high quality of life. They promote social and technological innovations and link existing infrastructures. They incorporate new energy, traffic and transport concepts that go easy on the environment. Their focus is on new forms of governance and public participation.

1.1. Study Area:

Baramati tahsil lies between 18° 2' 44" N to 18° 23' 19" North latitudes and 74° 13' 8" E to 74° 42' 47" East longitudes. It is located at an altitude of 538 meters above mean sea level. The tahsil lies in the eastern part of Pune district of Maharashtra. The river Nira flows west to east forming the southern boundary of the Tahsil and the district. The river Karha flows northwest to south-east Baramati tahsil is bounded by Indapur tahsil towards the east, Satara district towards the south, Purandar tahsil towards the west and Daund Tahsil towards the north. Baramati tahsil may be divided into two physiographic regions according to altitude. The first one is the hilly track above the 650 meters altitude observed at northwest corner of the tahsil. The other one is gently sloping belt along Nira and its

tributary Karha. There are two water divides; one divides the Nira and the Karha basin while the other runs from west to east between Karha and Bhima. The second belt of hilly region runs from northwest to southwest corner of the tahsil. The riverine belts along Nira and Karha occupy 40 percent area of the tahsil. This region offers favorable situation for irrigation and hence, agro-based development is exemplary. Topographically, it is almost a plain region with alluvial soils. The generalized direction of slope is from northwest to southeast in the Karha basin and from west to east in the Nira. Baramati tahsil is mainly drained by river Nira and its main tributary Karha. Nira is an important tributary of river Bhima. It is a natural boundary between Pune and Satara District (Fig.1). Baramati town is the head quarter of Baramati tahsil in Pune district of Maharashtra State. It is being at present administered by a “B” class Municipal Council. Now Baramati Municipal Council included Rui, Jalochi, Tandulwadi Gunawadi, Baramati (Rural) villages as additional area (Fig.2). Baramati municipal council old limit area was 434 hector and the extended area comprises 5058.78 hector.

Table No.1 Baramati City Urban Population

Name	District	Population Census 1991	Population Census 2001	Population Census 2011	Population Census 2016
Baramati	Pune	44,515	51,334	54,415	1,24,000

Area: 5058.78 hect. – Change: +0.58%/year [2001 → 2011] Gender Persons- Males-27643, Females-26772.
 Baramati: human settlement- Elevation: 538 m

Baramati is 99 Km. by road and 120 km. by rail from Pune, which is connected by daily air services to Mumbai and Aurangabad. Many Sugar factories have been set up in this area. The main occupation of the people is Agriculture. Wheat, Jawar, Sugarcane, Grapes and Cotton are the main crops grown over here. Sugar and Grapes are exported from here. There is a huge Market place for cotton and food grains. It has a great cultural heritage of the great poets Shreedhar and Moropant who composed well known verse *Shivleelamrut*, the holy book and *Kekavali* respectively. There are many more religious temples in and around Baramati. Baramati was under Yadav's rule, which was later taken over by Bahamani rulers. Siddheshwara temple was constructed by famous Bapuji Naik. Baramati uses 800 hectares of land as MIDC (Maharashtra Industrial Development Corporation) Industrial Area along Baramati-Bhigwan Road, 5 km outside Baramati town's municipal limits. The population of Baramati Municipal council as per the census of 2016 is 124,000 (Table No.1).

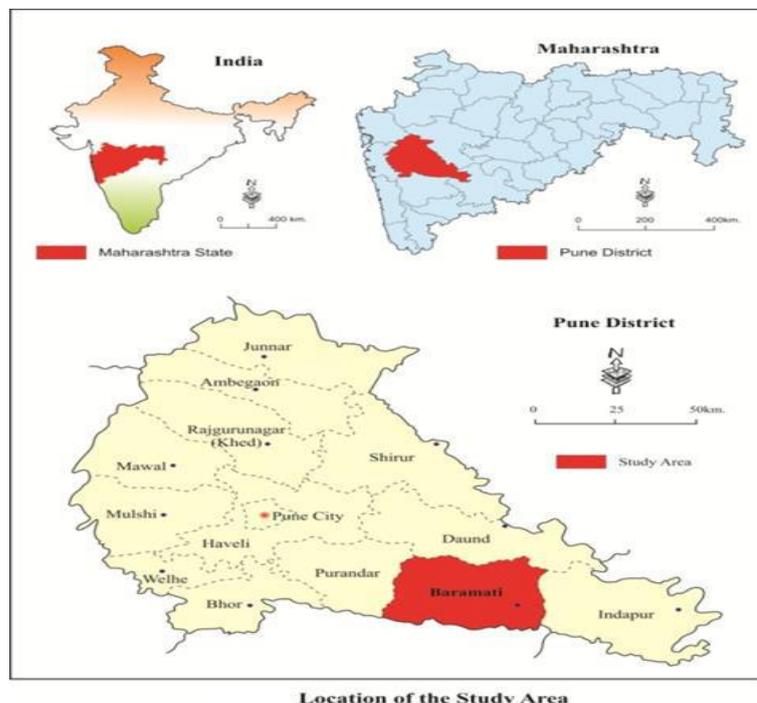


Figure 1

1.2. Objectives:

The following are the objectives of present research:

- To evaluate the strengths of Baramati city.

- To analyse the main features and facilities available in Baramati.
- To evaluate the opportunities and suggestions to designate Baramati as a Smart City.

2. METHODOLOGY:

The primary and secondary data have been used for the research paper. The information and data were collected from the academic journals, reference books, periodicals, internet and similar authorized publications. The cartography and GIS techniques are used to represent data. The published sources were, namely, Taluka Revenue Record, Socio-economic Abstract of Pune District, District Census Handbook, Department of Irrigation, Agriculture Trust of Baramati and Taluka Land Record Office

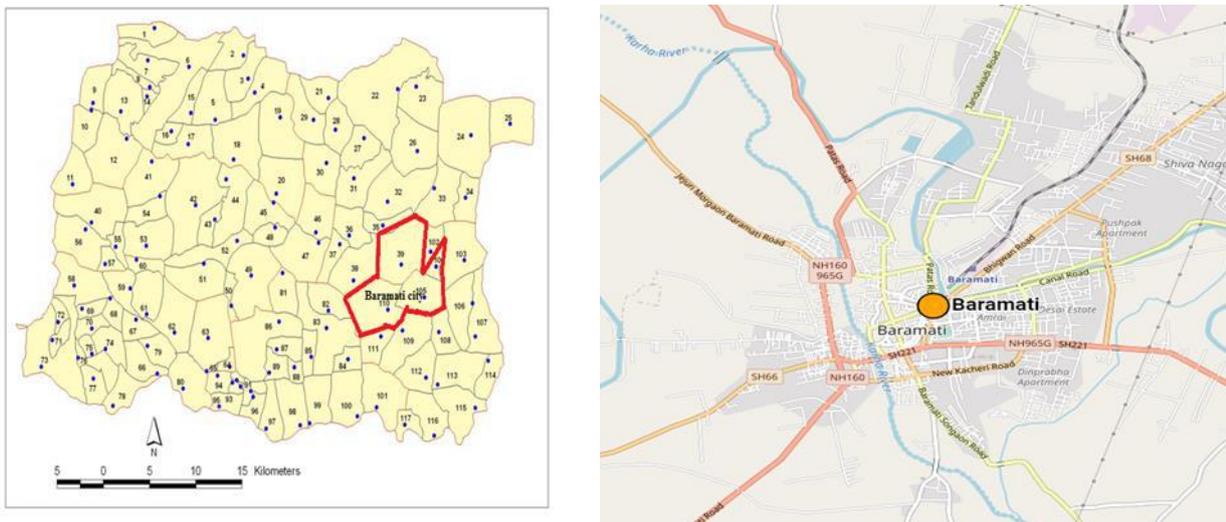
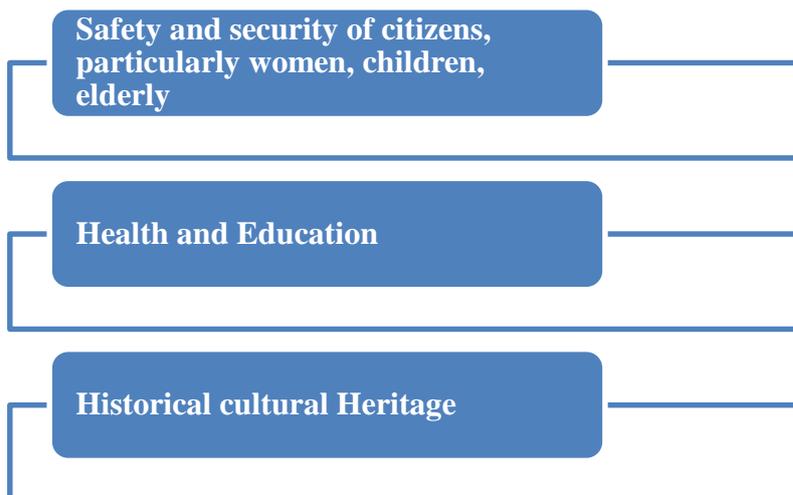


Figure 2 Location of the Baramati City





Main features of Baramati Smart City -

Some typical features of comprehensive development in Baramati Municipal Council are described below-

<p>•Industries in Baramati vary from textile to dairy and food products. Similarly, there are many foreign companies in Baramati like Piaggio, Ferrero and Schreiber-Dynamix Dairy Ltd., Baramati. The oldest plant in Baramati MIDC is the Kalyani Steels. Likewise, recent additions to the list of industries are Bharat Forge, Ferrero Rocher, and Bauli India.</p> <p>Job Opprtunites</p> 	<p>•Baramati and surrounding areas mostly depend on agriculture as the main source of income. The land in the region is moderately irrigated because of the Nira Left Canal irrigation from the Veer Dam. Nira River and Karha River also provide direct irrigation water to the farms.</p> <p>•Drinking water is also sourced from this canal. Additionally, Municipal Council also receives drinking water from Ujani Dam through a pipeline.</p> <p>Water supply</p> 
<p>• Main crops include Sugarcane, Grapes, Jowar, Cotton and Wheat. Grapes and Sugar are exported from here. There is a huge marketplace for cotton and food grains in the city.</p> <p>Huge Market</p> 	<p>•Baramati is well connected by road with major cities in the State. It is 100 km from Pune by road. It connects to major highways via the road network. Baramati is also well connected by the rail network to Pune via Daund Junction. Baramati has two bus stands, with main bus stand located on the Indapur road and the bus depot at MIDC. The depot provides buses to school children. Baramati is considered to be one of the future domestic airports in the region.</p> <p>Transportation</p> 
<p>•The City hosts two old temples which are built around 750 A.D. One of them is of Shri Kashivishweshwar - based on the west bank of the river, the other is of Shri Siddheshwar, located on the east bank of the river. Sidheshwar Temple is considered an architectural masterpiece. The temple is located near Babuji Naik's Mansion, which houses a gigantic idol of Nandi.</p> <p>Historical & Cultural Heritage</p> 	<p>• Website, complaint and redressal, inward & outward, Birth & death, Market & License, Town Planning, Shop act License. Land cell & buy Morgage, Citizen facilitation center, Property tax etc.</p> <p>•Digital/online facilities for farmers</p> <p>E-Governance & E-Services</p> 



3. SUGGESTIONS:

Some suggestions to make a Baramati smart city-

- ✓ CNG and PNG Gas access to domestic, commercial and industrial use
- ✓ Smart bus shelters with e-toilets
- ✓ Mobile app for tourism
- ✓ Solar master plan for city
- ✓ Integrated GIS based utilities management
- ✓ Women digital literacy centres
- ✓ Integration of mobility card for monument entry payments
- ✓ Waste-to-Energy (Bio Methanation)
- ✓ GIS based property and land management system
- ✓ GPS tracking and optimization of routes of garbage trucks
- ✓ Wifi- IT connectivity
- ✓ Smart card for all service payments
- ✓ Smart Bus stop
- ✓ Smart grid and energy management
- ✓ Rainwater harvesting system
- ✓ Smart classrooms
- ✓ Parking management (pricing)
- ✓ Online system of water connections
- ✓ Smart E- Rickshaw with charging station

4. CONCLUSION:

Baramati city fulfils most of the criteria of the smart city. It has lot of potential to become a smart city by making minimum changes and modification in existing system. The present infrastructure can be fully procured and utilized optimum benefits from it. The soaring economy and lifestyle of all livings in the city are making Baramati economically and physically rich. The city is marching towards green city or eco-friendly city. Utilizing natural sources of energy and trying save nature with our overall development is the basic concept of the Smart City and Baramati has been fully following and utilising its natural sources of energy.

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