

IMPACT OF URBANIZATION ON TEMPLE TOWNS OF ODISHA

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Declaration

"Statement of Originality"

I, **Gayatri Mukherjee** registered on 03.06.2019 do hereby declare that this thesis entitled "Impact of Urbanization on Temple Towns of Odisha" contains literature survey and original research work done by the undersigned candidate as part of Doctoral studies.

All information in this thesis have been obtained and presented in accordance with existing academic rules and ethical conduct. I declare that, as required by these rules and conduct, I have fully cited and referred all materials and results that are not original to this work.

I also declare that I have checked this thesis as per the "Policy on Anti Plagiarism, Jadavpur University, 2019", and the level of similarity as checked by iThenticate software is 5 %.

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Abstract

India's rapid 21st-century urbanization is clashing with its historic urban centres. A surge in migration and a lack of heritage bylaws are fuelling chaotic development by private builders. This unchecked growth is leading to the demolition of historic structures and a dangerous erosion of city identity.

Odisha's ancient towns and archaeological sites reveal a rich history, showcasing its pivotal role in India's maritime trade and cultural exchange. Its temples, evolving from humble beginnings to grand masterpieces, chronicle a millennium of artistic and spiritual growth. However, cities like Bhubaneswar, Cuttack, Puri, and Ganjam suffered severe decline by the mid-19th century due to neglect and colonial apathy. Bhubaneswar's historic core, in particular, is now caught between rapid urbanization and neglect. The three significant historic cities - Bhubaneswar, Cuttack, and Puri, developed with distinct purposes and have since evolved into major urban centers. Puri and Cuttack have largely retained their original urban character. Puri remains a vital hub for religious tourism, centered around the Jagannath Temple, with development still largely focused on the temple area. Cuttack, originally a military town, served as an administrative capital for centuries, including during British rule and early independent India, until Bhubaneswar became the new capital. Bhubaneswar, however, exhibits a more diverse development trajectory. Historically an administrative and religious capital from the Ashokan era to the 17th century, it's known for its unique Kalinga temple architecture. After a period of decline, it was chosen as the second planned city of independent India, transforming from a "Temple City" to the "Capital City." Its continuous evolution and development prominence make Bhubaneswar an ideal case study for examining the impact of urbanization on a city's historic fabric.

Chapter 1 provides an introduction to the historic towns prevalent in Odisha. The historic urban settlements can be divided into three categories - trading and manufacturing towns, administrative towns which served as the capital of a kingdom and religious towns which were also centre for learning. Odisha too was no different. Katak and Jajpur were significantly the administrative towns, Puri is a religious town

while Bhubaneswar served as combination of religious and administrative town. Odisha was recognised as a settlement as mentioned in the epic Mahabharata being known as Kalinga and Odra. As per the accounts of famous Chinese pilgrim Hiuen Tsang, the current state boundary of Odisha contained the kingdoms of Kalinga, Utkala, Odra, Toshali, Kongoda and Kosala. Temple towns and urban settlements are simultaneous developments in many historic towns of India. Often the temple architecture reflect the pattern of urban settlement with the temple at its core. Odisha's temple had four phases – formative, transitional, mature and decadence. The same can also be attributed to the settlements of Odisha – particularly the selected area of study, the Ekamra Kshetra in Bhubaneswar. The major historic settlements in Odisha are Puri, Sambalpur, Bhubaneswar, Jajpur, Ganjam and Katak. All of them have evolved through the ages and have developed into significant urban centres now. There is a pressing need for a detailed study of the effects of urbanization in these historic towns of Odisha and help in determining key indicators which shall be helpful in restricting the adverse effects of urbanization in temple towns of Odisha.

The methodology of this research involves identification of urban centres in Odisha, selection of the appropriate urban centre, literature studies and analysis of earlier works to identify the key parameters for a detailed survey of the selected centre, detailed visual survey a part of the urban centre as practically possible on site, response from users to a relevant set of questionnaire prepared as per the key parameters determined, compilation of data and detailed analysis based on various models such as linear regression, variable regression etc. to determine the outcome of the survey quantifying the determinants or parameters. This research will help in the opening of avenues for future works such as determination of guidelines for holistic urban development in similar urban areas.

Chapter 2 elaborates the study of the earlier research undertaken in similar topics. The research was classified into three categories – historic background of temple town of Odisha, urbanization trend in Odisha and impact of urbanization in temple towns. The studies – especially the account of Fergusson and Sterling has been particularly helpful to understand the urban centres of Odisha and undertake a basic study of the

towns of Puri, Katak and Bhubaneswar. The studies underline the metamorphosis of development linking architectural prowess to broader social, economic, artistic and religious advancements.

Chapter 3 provides an elaborate study of the development of Bhubaneswar, Puri and Cuttack – each with its own timeline which range from the 6th century CE up to the 19th century CE. This is based on the studies conducted for detailed analysis, as per the review of earlier works, a comparative development of the religious institutions existing in the city. Based on this, the Ekamra Kshetra of Bhubaneswar was selected for the detailed field study and analysis as per the selected parameters. This is due to its rich historic background, its transformation from a temple town to the administrative capital of modern Odisha and the current rapid development of the city.

Chapter 4 provides an overview of the city of Bhubaneswar, focussing on Ekamra Kshetra – the historic part of Bhubaneswar. The boundaries of Ekamra Kshetra are defined with insight of the activities which still form the core of the sacred place. Important temples such as Lingaraj Temple, Ananta Basudeva, tanks such as Bindudagar etc all fall within the Ekamra Kshetra and form part of the core historic place. An overview of the place is also mentioned in the study highlighting the key issues that are faced. The Ekamra Kshetra is also termed as the old city of Bhubaneswar currently.

In Chapter 5, the parameters determined as per the review of earlier works and significant urban design studies are outlined. Based on this, a key performance indicator – form for detailed visual survey is developed. This research, using the old city of Bhubaneswar as a case study, seeks to create guidelines for harmonious development and proposes a 'Heritage Commission' to protect these vital historic urban centres. Visual survey of over 470 structures across 80 acres in Bhubaneswar's Lingaraj area—encompassing the significant Lingaraj, Chitrakarini, Mohini, and Suresvara temples—has uncovered a pressing issue -modern development is undermining the area's sacred identity. The detailed analysis based on the survey revealed a mixed land use, combining recent commercial and residential

constructions. These new buildings primarily utilize modern materials like cement and RCC framed or load-bearing structures, indicating construction from the late 20th century onwards. This stands in stark contrast to the area's traditional architecture. This adverse development is largely attributed to a lack of thoughtful planning, uncontrolled population growth, and individual profit motives. While the fortunate absence of high-rise structures might be due to height restrictions or lower affordability, the aesthetic impact is undeniable. Critically, these modern buildings are constructed without regard for nearby heritage structures, featuring contemporary facades that clash with the sacred environment. This lack of homogeneity actively degrades the inherent religious and pilgrimage-focused nature of the space.

Chapter 6 marks the comprehensive survey in Bhubaneswar's historic temple district, incorporating feedback from residents, users, and experts, which has vividly exposed the damaging effects of rapid urbanization. The core issues are clear: inadequate parking and resting facilities, and a chaotic mix of vehicular and pedestrian traffic. This disarray frequently clashes with the sacred rituals performed in these areas, severely compromising the pilgrimage experience. Haphazard development, arbitrary decisions, and piecemeal improvements have only exacerbated the disorder.

Chapter 7 critically assesses the findings of the survey. The key determinants are put together to define the dependent and independent variable for linear regression model and variable regression model analysis. One independent variable and eleven dependent variables are studied to determine the statistical findings of the survey. Percentage of changes to the building height, storey, floor to floor height, plot size, aspect ratio, approach road width, type of construction, nature of facades, usage of the structure, ground coverage etc are determined statistically as per the regression model. The survey reveals alarming changes driven by urbanization. Façades have drastically shifted to contemporary styles, often involving demolition and new builds to accommodate growing families. Traditional materials like brick and stone are replaced by modern concrete and steel, visually cluttering the streetscape and diminishing the area's sanctity. Building uses have morphed; historic residences and

pilgrim shelters now include commercial ground floors with residential or rental units above, frequently lacking setbacks due to owners' greed. Building heights often disregard road widths, suggesting violations of byelaws. This unchecked development, spurred by population surge and lack of guidelines, is erasing traditional features and making the micro-climate hotter. The city's unique historic fabric is rapidly eroding.

Like many historic temple towns across India, Bhubaneswar's homogenous character is being eroded by unchecked urbanization. The development patterns and public infrastructure profoundly shape an area's physical, social, and economic well-being, underscoring the need for informed decisions by urban planners. There's an urgent call for a dedicated heritage district in this area, overseen by an Urban Arts Commission or similar authority, to ensure comprehensive and holistic development. New constructions must feature homogeneous facades that respect, rather than overshadow, the grandeur of historic structures, while clearly delineating them. Future urban growth must embody a mutual respect for both history and modernity. This study aims to highlight these critical urbanization challenges, using Bhubaneswar as a case study to formulate an ideal solution with active stakeholder involvement. A comprehensive plan is vital, focusing on heritage conservation, sustainable infrastructure, community engagement, and tourism promotion to ensure its revitalization. Integrating Odisha's rich heritage with modern needs is crucial for creating vibrant communities. For Bhubaneswar, a Heritage Development Plan is urgently needed to protect its millennium-old cultural legacy.

List of Abbreviations

HDP- Heritage Development Plan
LPA- Local Planning Authorities
JnNURM- Jawaharlal Nehru Urban Renewal Mission
AIIMS- All India Institute of Medical Sciences
IIT- Indian Institute of Technology
NISER- National Institute of Science Education and Research
BRIT- Bhubaneswar Regional Improvement Trust
BDA- Bhubaneswar Development Authority
FAR- Floor Area Ratio
DUAC- Delhi Urban Arts Commission
UNSDG- United Nations Sustainable Development Goals

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1. Introduction

1.1. Background

India, an age-old civilisation is of the fastest developing countries of the world. Most of the urban areas in India have rich and varied history associated with them. Cities such as Banaras, Prayagraj, Madurai, Mahabalipuram, Kolkata, Patna and even Delhi have incredible history linked to it. These urban centres are a testimony of centuries of how they have been transformed over the ages to define what they stand for in the current time. However, the recent urban development being undertaken in such historic cities in the last part of the bygone century have eventually turned these towns into large expansive cities, contributing towards loss of the original characteristic of the urban center, which it stood for over the years. History of many such ancient urban centres are eventually fading away to the pangs of modern development. (Praharaaj, 2012) The heritage of the city is gradually becoming invisible. The heritage zones of many cities, a part of our rich heritage, are now in a very poor condition. Within the vast domain of religious & socio-cultural sphere, different forms of worships & rituals have sparked the rise of different forms of sacred structures & its associate settlement. In course of time, the temples became the center of all civic and social life. The religious precincts within these temple towns not only function as religious places but also acted as cultural and philosophical center & at the same time supported the economy of the city through its retail & commercial activities. (Rajakumari, 2019) The center obtains additional sanctity from the fact that creation itself took place at the center, the point from which chaos gave way to the ordered cosmos. "Centers are goals or foci & places of orientation, where one experiences meaningful events or are place of action where particular activities are carried out. The religious precincts containing the center are the area of sacred or the zone of Absolute reality. The concern of the past gives rise to certain value parameters, which decides the character & personality of the core. The personality of the core like the city has evolved gradually & is not fixed. So, the core must always remain capable of change & the change must be subject to control. The shape & appearance are derived from its past history as well as its present functions & to some extent also from its future development. Every city, town &

village carries evidence of its growth & history on its face. At the core this has a special significance because it has the personality that distinguishes one place from another (Rajakumari, 2019). In a temple settlement, the temple has the same role as an industry in the industrial town. Temples provide a focus guiding & behavioural, spiritual, social, cultural hold over the settlement. Evidence from archaeological finds across the Indian subcontinent clearly shows that settlements began to form as far back as the origins of its civilization. Looking at the initial growth of cities and urban areas in undivided India, we can trace their beginnings to around 5,500 years ago. By approximately 2500 BCE, major cities like Mohenjo-Daro and Harappa (now in Pakistan) were established in the Indus River Valley. Another significant phase of urbanization occurred around 600 BCE, leading to the creation of early historical cities in India. During the ancient and medieval periods, towns such as Pataliputra (modern Patna) and Vaishali flourished under the Magadha rule, around 300 BCE. According to Vastushastra, ancient Indian towns were categorized into various types, each distinguished by its specific function. Traditional towns can be classified broadly into:

- a. Trading and Manufacturing Towns often termed as 'Nagar', 'Patana' were majorly the towns where commercial activities happened.
- b. Rajdhani towns served as planned political and military centers, forming the administrative heart of a kingdom.
- c. Meanwhile, Matha and Vihara towns were hubs for educational, pilgrim, and religious activities.

Urbanization throughout Indian history was characterized by unique spatial, economic, religious, socio-cultural, and political aspects (Madan, 1971), which can be categorized under three main themes:

- i. Early urbanization was deeply linked to India's shifting political landscapes and cultural history. Traditional towns often featured fortifications like walls and moats for defense. Beyond security, the planning of ancient cities meticulously accounted for the needs of their diverse populations, including the segregation of castes into distinct wards and the strategic placement of

areas for manufacturing, commerce, trade, religious activities, recreation, administration, and justice.

- ii. **Economic:** Guilds, known as 'shreni,' were a key characteristic of traditional towns, organizing merchants and craftsmen. These guilds played crucial roles in the towns' economic life, handling banking, trading, manufacturing, and even some judicial functions.
- iii. **Religious and Socio-cultural:** The rulers of traditional urban centers often supported specific religions or sects, which significantly shaped the towns' social organization and culture. For example, Pataliputra embodied Brahmanical Hindu civilization under Chandra Gupta Maurya, but later flourished with Buddhism during Ashoka's reign. Traditional towns were diverse, comprising various religious, sectarian, and caste groups, each adhering to their own customary laws.

Ancient Odisha, known by various names including **Kalinga, Utkala, Odra, Tosali, Kangoda, and Kosala**, possesses a rich cultural heritage encompassing **Hindu, Buddhist, and Jain** sculptures. References to Kalinga and Odra are found in the Mahabharata (mentioning the Vaitarani river and Goddess Viraja) and Ramayana (Das, 2019). Further accounts appear in Puranas (Vayu, Matsya, etc.), Jaina and Buddhist literature, the Kapila Samhita, and foreign accounts like that of Chinese pilgrim Hiuen Tsang (visited 638-39 A.D.). Inscriptions also play a vital role (Mishra L., 1989).

Key Territories & Capitals:

- **Kalinga:** Stretched from the Ganga mouth to the Godavari. Early capital Dantapura is unidentified. Kalinganagara (correlated with Sisupalagarh) was the capital of Kharavela.
- **Utkala:** Earliest capital was Viraja, identified with modern Jajpur.
- **Odra/Udraka:** The basis for the present name Odisha. Muslim geographers described it as a large coastal kingdom.
- **Kangoda:** A flourishing 'Mandala' state (6th-7th century A.D.) encompassing the undivided Ganjam district.

- Kosala: Mentioned in the Atharvaveda, comprising parts of modern Chhattisgarh and western Odisha districts (Sundargarh, Sambalpur, Bolangir). Sambalpur was its political hub under the Chauhans.
- Cuttack (Katak): Became the new capital of the Gangas under Chodaganga in A.D. 1110.

The economy transitioned from being primarily agricultural in prehistoric times to an urban economy following the discovery and use of iron in the early centuries BCE. The Mauryan occupation of Kalinga further accelerated the process of urbanization (Mishra L. , 2011).

Ancient Odisha had an extensive network of urban settlements and ports, confirming extensive maritime trade with Southeast Asia and the Western world. Tosali (Dhauri) and Samapa (Jaugada) were important Kalinga political centers during the Ashokan period. Sisupalgarh is confirmed as a well-planned, fortified early historical city and an international port with global connection. Key ports of Odisha were Tamralipti, Khalkattapatna, Chelitalo/Manikapatna, Kalingapatnam, and Palur/Dantapura (Patra, 2004). Archaeological findings like coins, knobbed ware, pottery, beads, and metal objects at sites such as Sishupalgarh and Jaugada attest to the development of trade, arts, and crafts.

A notable aspect of early social formation is the non-existence of caste proliferation until the tenth and eleventh century A.D., largely due to the predominance of the tribal population in the lowlands.

1.2. Temple Development and Urban Settlements

Odisha possesses a vibrant cultural heritage, rich in music, dance, dramatics, and diverse art and craft forms (Patra, 2004). This cultural richness stems from its remarkably preserved magnificent monuments, ancient caves, rock-cut sculptures, and grand temples. Evidence of Paleolithic rock paintings can be found in the Sundargarh, Jharsuguda, and Kalahandi districts, while the ruins of Sishupalgarh Fort showcase a meticulously planned and fortified ancient city. Excavations at Ratnagiri

in Cuttack have revealed the remains of a magnificent main Stupa, two spacious Viharas, several Stupas and numerous Buddhist sculptures of great artistic excellence.

Study of the art and craft traditions, derivations from the archaeological investigations in various parts of the state can provide an important lead to the social formations and the physical settlements.

Temple developments are always associated with the settlements around it or vice versa. Thus, the period of temple building can also be associated with the growth and decadence of the historic settlements.

Evolution of Temple Architecture in Odisha:

The evolution of temple architecture in Odisha is portrayed from the Parasuramesvara moving on to Lingaraja passing across the Muktesvara and Vaital, and ultimately culminating at Puri and the majestic Konark. (Garnayak, (2007). This series of evolution can be seen through four distinctive phases of temple building:

- i. Formative phase - Small and moderately high structures built from the 6th until the first half of the 9th century AD, synchronized along with the reign of the Sailodbhavas and early Bhauma-karas.
- ii. Transitional phase – Initiated from the second half of the 9th century until the first quarter of the 11th century AD, during the reign of the later Bhauma-karas and the first half of the rule of the Somavamsis (Kesharis), the prominent features of this period were the introduction of rampant erotic sculptures incited by the philosophy of Vajrayana.
- iii. Mature phase – Ranged from the Somavamsis of 11th century continuing up to the Gangas of the 13th Century, (Madan, 1971) this period presents the Odishan temple style at its pinnacle.
- iv. Phase of decadence–After the rule of the Gangas dynasty from the 14th to 16th century AD, the temple building activities slipped into a phase of decadence under the Suryavamsi-Gajapatis. This was mainly attributed to the political instability in the region.

Urban Settlements in Odisha:

The progress of urban settlements in Odisha can be grouped into 4 categories as per their period of development (Mishra L., 1989).

- i. Ancient (Prehistoric stage) – Accurate details of this period is very difficult to trace. However, the archaeological investigations and rock art, paintings provide some light on the state of urban affairs. Sishupalgarh, Kalinganagar, Toshali were some of the ancient towns discovered in investigations. (Sinha, 2014)
- ii. Medieval (from 3rd Century A.D. upto 1803) - Jajpur, Cuttack, Ganjam, Sambalpur, Bolangir, Mayurbhanj were some of the prominent urban centres during this period. These centres were under changed hands and have gone through their state of rise and fall according to the fate of their rulers. Maritime activities in the coastal towns were a prime source of economy. It is also worth mentioning that some of the urban areas in the interior parts of the state also had trade relations with various far-off places due to the existence of large river network. The same has been established by the discovery of potteries and remains in archaeological investigations.
- iii. British period or Pre-Independence period (1803-1947)- The British period shows an upward trend in urbanization. The introduction of railways led to river ports decline and seaside towns witnessed a stagnation. The improved road transport brought about greater mobility and a rapid increase in the number of towns. The towns of Orissa can be grouped into: Old towns, Pre-war towns, Wartime towns and Post-war towns. The number of towns increased to 29 in 1941, as against 10 in 1881.
- iv. Post-Independence urban settlements (1947-1981)- The maximum number of towns 108 in 1981 came up during the post-Independence period. Mostly industrial, commercial, mining, nodal tourist centres, religious centres and administrative centres came up, along with a few overgrown villages.

Having established the evolution of temple based settlements, the following section traces the key historic towns on Odisha that exemplify this trajectory.

1.3. Major historic towns in Odisha

In Odisha, currently there several historic towns – small and large, which have been affected by the industrial revolution and have eventually grasped into the urbanization pattern. Some of the significant ancient urban centers in the state which have now converted into sprawling cities/towns are:

- i. **Puri:** Though mentioned in the Rig Veda. (Patel, 2003), Puri's definitive origins date to the 4th century A.D., owing its existence to the Lord Jagannath Temple. Its religious significance was cemented in the 9th century A.D. when Shankaracharya established it as one of the Dhams. The present temple, central to its status as a sacred pilgrimage town, was constructed in the 12th century A.D. by King Anantavarman Chodaganga Deva. This pilgrimage focus has historically driven the town's urban sprawl.

Known as Sankha Khetra, its shape resembles the Sankha (divine conch), an instrument of Vishnu. Historically, the area was described as 5 koshas (10 miles) in extent, with the Nilagiri hillock (where the temple stands) at the center. Geographically, the Loknath temple is at the broad, western end, and the Nilakantha temple is at the eastern cone.

Puri has developed into a major tourist destination combining culture and beach tourism, centered on the temple and the sea. This growth, particularly the unscrupulous construction of hotels since the late 20th century, is fundamentally altering the town's character. Indiscriminate mixed land use is shifting the core from religious/cultural to commercial, leading to high density, degraded physical environments, and poor living conditions. This haphazard development is eroding the urban fabric, creating sustainability challenges due to unplanned tourism, and posing hazards due to insufficient enforcement of Coastal Regulatory Zone Regulations. The city also lacks planned recreational spaces.

- ii. **Sambalpur:** Sambalpur, established around the 7th century AD and initially dominated by tribal populations, became the capital of the Kosala kingdom on the banks of the Mahanadi river (Mishra B., 2012). Under the Chauhan dynasty, it served as the political center of 'Atharagad' (the state of eighteen forts), which

covered parts of modern Odisha (Sundargarh, Deogarh) and Chhattisgarh (Raigarh, Bilaspur).

Sambalpur's development centered around the Samleswari temple, a significant goddess of the local tribal population. While the original royal quarters remain near the temple, rapid urbanization, particularly driven by the establishment of major ancillary industries like coal, steel, and power plants within 100 km, has fundamentally altered the city. Sambalpur is now the most significant commercial hub in Western Odisha, and the historic core is rapidly being obscured by encroachments as it transforms into a modern urban center.

- iii. **Ganjam:** Jaugada, situated by the Rushikulya River, is named in Ashokan inscriptions and was part of ancient Kalinga (Dakshina Kalinga) (Fergusson, 1910). By the 7th century, it became the capital of the Kangoda empire, protected by hills and the sea. British historian James Fergusson noted its remains indicated a splendid capital complex with temples and settlements, later severely damaged by Muslim rulers. In the 17th century, it fell under the Qutb Shahi dynasty (Abdullah Qutb Shah). The British also subsequently ravaged the archaeological remains of Ganjam.

After independence, Ganjam remained an important trading and administrative center in southern Odisha. However, rapid urbanization has led to the loss of its historic fabric, with modern buildings replacing traditional ones. Many significant water bodies have been covered to facilitate this development, causing serious urban infrastructure problems in the city.

- iv. **Jajpur:** Situated on the bank of the River Baitarani, Jajpur was historically known as Viraja Kshetra (named after the existing Viraja temple). It served as the capital of the Kalinga kingdom under the Kesari dynasty and later the Utkal kingdom. Jajpur remained the capital until the 17th century, when the seat of power was relocated to Katak (Fergusson, 1910).

It was a significant Shakti Pitha (abode of Goddesses), centered around the Viraja temple and including other temples like Ratnagiri and Udaygiri on its outskirts. The city suffered severely from Muslim invasion from Bengal, which, according to James Fergusson, resulted in most of its temples being destroyed, thus

changing the original nature of the Shakti Pitha. Eventually, during the Maratha control, it was merged into the district of Katak, only to be separated in 1993. Today, Jajpur is a major center for mining and commercial activities, with many industries developing and further diluting the essence of the historic city.

- v. **Katak:** Cuttack (Katak) is traditionally held to have become the capital of the kingdom in the 10th century AD when Markat Kesari of the Kesari Dynasty built a stone revetment to protect the site from the river. Its strategic location, naturally bounded by rivers, led to its selection as the capital of the Kalinga and Utkal kingdoms over Jajpur (Viraj Nagari). Unfortunately, the city suffered significant damage from Muslim intolerance and later British indifference, losing much of its original form. The remains of the Barabati Fort, which housed the great 16th century palace of Mukund Deo, are still largely misunderstood. Abul Fazl, a courtier of Akbar, described this palace as having nine stories or enclosures (James Fergusson, 1910). During the Maratha rule, the city greatly prospered as a commercial town, becoming a significant exchange center with Nagpur (in the west) and the northern territories of Bengal. Katak served as the capital of Odisha throughout the British rule (from 1816) and remained the capital until 1948, when it was shifted to Bhubaneswar due to a shortage of space. Today, Cuttack still functions as an important commercial and trading town in the eastern part of the state.

As Cuttack underwent urbanization, it began to face issues common to historic Indian towns, such as congestion and inappropriate infrastructure. New settlements grew in the ancillary areas, while the older part became more densely populated with narrow lanes, ultimately decimating the historic nature of this millennium city.

- vi. **Bhubaneswar:** Bhubaneswar, chosen as Odisha's new capital in 1946, is named after its presiding deity, Lord Shiva (Tribhuvaneswara). Known anciently as Ekamra Kshetra (evidenced since the 6th or 7th century AD), it developed into a major center of Saivism following the 11th century construction of the Lingaraja Temple. It remains a living pilgrimage center and was also a notable Shakti Pitha.

Archaeological remains, spanning from Sishupalgarh Fort to the Khandagiri caves, provide evidence of Buddhist, Jain, and Hindu monuments, and point to the formation of eight sacred complexes ('Asta-ayatana'), which tragically were not considered in the planning of the modern city.

Bhubaneswar transitioned from a temple city to the state capital in 1948 (Seymour, 1980). Initially, the new capital was built at a distance from the original temple town, with little effort to maintain distinct identities. As the population grew, the city expanded in seven directions, absorbing surrounding villages, though the interdependencies of the city's main functions were largely overlooked.

The old city (around the Lingaraj temple) has grown unscrupulously, ignoring existing bylaws and heritage. Restricted town planning in this historic core has led to major public infrastructure issues, including a proliferation of slums and traffic problems due to narrow roads in densely built areas (Praharaj, 2012).

1.4. The need of the research

As it is evident from the above fact that our religious centers and their precincts within the temple cities must be properly guided in their growth due to urbanization and should be conserved. The temples are no means “An Ivory Tower” set apart from the community, it is rational to shape the physical environment of sacred place conducive to the purpose for which it is intended to i.e. by consolidating ritual and cultural activity in close contact and precincts. There is a need to integrate the structure of the precinct with the overall structure of the area to give a clear theme and meaning of sacred area.

Hence this study has potential of research as it would help to revive our past heritage, rationalize development activity which will add to the imageability of urban centers.

1.5. Agenda and Significance of the research

Odisha, historically rich in temples, ports, and old towns, is mentioned in texts as early as the 10th Century BC. Its glorious past, documented by travelers and historians like Huien Tsang and James Fergusson, survived centuries of invasion and retained its

character until the industrial era. The modern state was formed in 1936, and later developed planned cities like Bhubaneswar (declared capital in 1948) and Rourkela.

Odisha is currently one of India's fastest-growing states, characterized by rapid urbanization and real estate development. This growth, marked by skyscrapers and modern amenities, often results in a mixed blend of residential, commercial, and institutional spaces that are fundamentally damaging the character of the original historic cities.

In the absence of strict planning regulations and urban design guidelines, this rapid development is concentrated within the historic cores of old Odishan cities, severely affecting their original identity. The historic core of Bhubaneswar, known as Ekamra Kshetra, is facing significant degradation due to pressure of urbanization:

- **Loss of Identity:** The map of the historic core is no longer identifiable; its cultural identity and historic character (temples, tanks) are rapidly fragmenting and being lost.
- **Infrastructure Failure:** Deterioration of the physical environment includes poor infrastructure, major traffic issues on narrow roads, and a lack of amenities for the local and floating population.
- **Environmental Degradation:** Negligence of ecological aspects, such as building over areas that affect natural drainage, leads to serious environmental problems.
- **Planning Conflict:** Uncontrolled growth, lack of development control, and conflict over land ownership result in insensible intervention and encroachment. Slums are proliferating, and poor accessibility affects monument visibility for visitors.
- **Policy Gap:** Most historic areas currently lack a formal management policy for heritage zones.

To address the conflict between heritage protection and infrastructure development, there is a critical need to establish a framework for urban development around historic

sites. This complex process requires an approach that is inclusive and practical, focusing on the resolution of social and planning problems. The proposed framework for developing a Comprehensive Heritage Plan includes:

- Identification of Core Heritage Zones: Categorizing monuments under National (ASI), State, and Local Authorities.
- Detailed Listing: Further detailing monuments based on their custodian.
- Development of Norms: Creating development parameters based on relevant heritage acts (National Monument Act, State Heritage Act, Local Guidelines).
- Current Status Survey: Conducting a detailed survey of current urban affairs in each zone.
- Action Plan: Listing shortcomings and necessary measures for development.
- Final Outcome: Creating a Comprehensive Heritage Plan for each identified zone.

This research, focusing on Bhubaneswar as a pilot study, aims to derive an adaptive solution for this ongoing conflict.

1.6. Research Questions

a. How the historic towns of Odisha have been evolved with time?

The foremost question which this research will attempt to answer is the reason for development, existence and sustenance through history of this age-old settlement which has eventually overcome the wraths of invasions of several oppressive attackers. It will also be important to decipher how these settlements have gradually developed and what changes have occurred historically with the advent of centuries which brought change in the rule, beliefs, social structure and advancement or abasement, as the case may, be in these historic settlements.

b. What are the impacts of urbanizations in the heritage zones / historic cores of such settlements?

While each of these urban centers have evolved through the ages, it would be crucial to derive and understand if there still remain of some of the original structures which would have adorned the city. This includes the existence of forts, walls, temples, tanks,

water bodies or similar structures which display tales of the past. The impact of urbanization on these historic settlements need to be analysed to derive a realistic of the current situation.

Another expository which this research attempts to derive is what effects the urbanization factor had on these historic settlements. This can be studied through the review of the urban spaces around the remaining structures and how these spaces have transformed – whether it has conductively affected or adversely affected the structure and historic settlements. This study would be an interesting find given that efforts are to be made to reverse the adverse effects.

c. What are the present needs of physical, socio-economic, cultural infrastructure in such areas?

Most of the ancient settlements in Odisha have now become important urban hubs. Either they have transformed into important commercial towns or trading towns or significant hub of political activities such as state capitals; while some have been engulfed by the modern mining industry which has exploited the land and life of the people of the state to a great extent – somewhere for good, somewhere for bad.

Through this research, a deliberate effort has been made to understand how these historic settlements have adapted themselves to the modernization and industrial revolution – especially in the state and transformed itself into what exists today.

A detailed morphological study will help in analysis of the current physical, socio-economic and cultural infrastructural situation and the need and scope of improvement in this regard.

d. What kind of policy measures, planning regulations and urban design guidelines should take place for such heritage zones of the state to mitigate the present scenario?

With the identification of the critical issues and damages that have been incurred over the last two to three decades, the next step would be to also derive on solutions on how these affects can be reversed to the extent that its practical and acceptable to all versions of the societies as well as urban pundits. This research paper will look at some

of the possible solutions that can be undertaken in either of these urban centers in Odisha. It would study any similar activities that have been undertaken in other parts – specially within India since the Indian context is specific and highly relatable. Based on these studies, suggestions would be made for development of a model space that would serve as a precedent for existence of heritage district in amalgamation with modernism – which is the need of the century in current affairs.

1.7. Aim and Objectives of research

The aim of this research is to understand and evaluate the impact of the present urbanization happening in the temple towns of Odisha. The objectives of the research is to enhance the understanding of the following:

- **To understand the evolution pattern of the historic towns of Odisha:** These age-old urban centers of Odisha have evolved around the temples. As with the case in every old city of this country, Odishan temples and its surroundings are inter-related with each other forming the basis of urban development. Thus, to understand the evolution of these settlements, it is critical to understand the evolution of Odishan temples, mainly the development of the typical temple building style. Odisha has a typical form of temples. Though originally derived from the Nagara style, they are altogether different style and identified as the Kalinga style or Odishan style of temple architecture. (Parashar, 2016). The Odishan temples have transformed through centuries and so also have the settlements. Elements of the temples redeveloped must have links to the development pattern of settlements amongst several other geo-political factors. Following the study of temples, the study of urban affairs have to be studied to analyse the relationship between temples and its surrounding settlements. The changes have to be correlated with the temple development and how modernization / urbanization influence settlements. (IJIRST, 2, 10).
- **To assess and analyse the impact of present urban sprawl happening in the temple towns:** The modification of these urban pattern, growth of the city, addition of new areas, pattern shift in settlements, reasons behind the shift in pattern will have to be studied in relation to the temples. This can be associated

with several reasons which have to be studied and identified. With the advent of urbanization majorly after Independence, the rampant growth of the cities have to be analysed. The changes and periodic shift in the development have to be identified and reasoned with. This will help understand the city better.

- **To evaluate the present needs of infrastructure in such settlements:** The need of this century is to ensure that history and modern development go hand in hand. There is adequate recognition, demarcation, amalgamation, mutual respect in between these two. Only then will an ideal situation of urban model development work.
- **To formulate urban design guidelines, an appropriate framework to restrict such unthoughtful developments in the heritage zones:** Broad guidelines have to be developed towards this cause. Intention is to highlight practical solutions which are acceptable to the modern world and practical enough to be adapted by the government. (Patel, 2003) There are already several cases of such inclusive and holistic development around the world and our country too is opening up to it. This study can be considered as a prelude to them.

1.8. Scope and Limitations

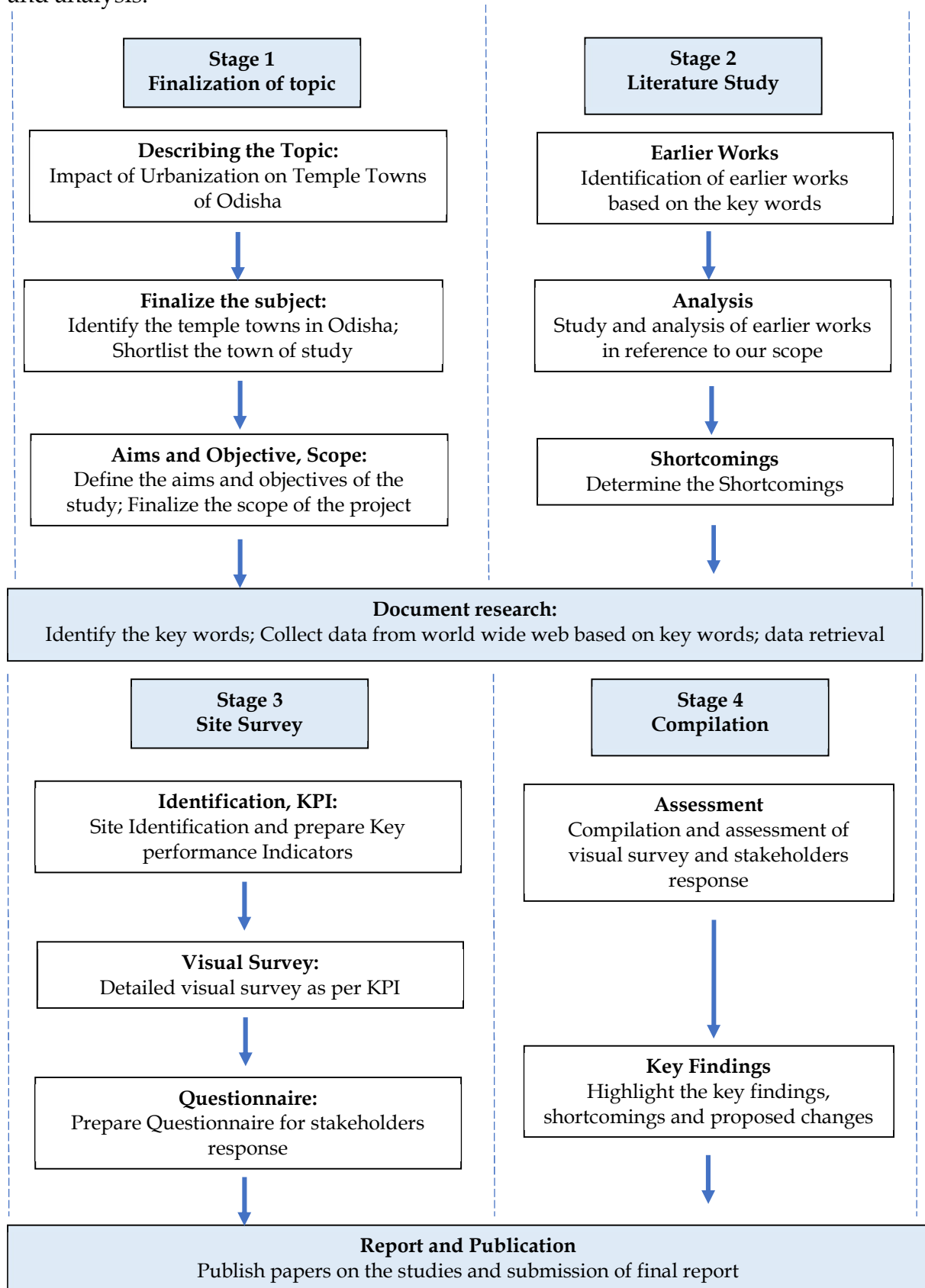
Like any other study, this study too has been faced with several limitations. One of the major factor is the rapid urbanization in these historic cities – mainly with opening of the metal and ore exploration in the country. There has been rampant exploitation of the resources – mainly the land in these cities which have indirectly become the victims. Unscrupulous growth has happened with a sudden burst of economic reforms which was never accounted for in the last 25 years in this state. Small and large industries have cropped up with little respect to these historic remains. Original fabric of these historic settlements are being eventually replaced with tall modern structures – majorly cement and concrete. Due to limitations like time, budget and manpower, the study area is only limited to heritage zone of Bhubaneswar. The trend now is people moving away from these settlements, mostly in search of livelihood. In many cases, the weaker sections of societies are mostly found residing in these areas,

who are eventually moved by the stronger real estate agents and these parcels of land are bulldozed to make way for modern constructions. (Patra, 2004)

With the opening of the economy, the social fabric of the settlements has also changed leading to several changes in the original structure of the society and the settlements as a whole.

1.9. Research Methodology

This research has adopted an inclusive methodology which includes a host of studies and analysis.



1.10. Conclusion

The 21st century dawn has brought new lease of life to India. Developments have been taking place at a very rapid pace. In the last decade, our country has been at the forefront of developing nations. Infrastructure development is rapid than earlier and changes in the urban centers are far too fast paced. With this rate of development, the fabric of the urban centers is changing expeditiously and the situation in the cities and towns are changing almost every year. There is a huge surge in migrant population from villages to urban areas leading to additional load on the city infrastructure, making the situation furthermore chaotic. A dire need is felt amongst the planners and administrators to rapidly develop infrastructure which can house this influx. Private developers have smelled the opportunity and have started rampant development with little respect to what exists. Even the urban local bodies and competent government agencies are under pressure to approve these developments in the absence of any adequate heritage bye laws. Private developers twist the facts and present it in a manner that their modern development proposal is approved by the competent authorities – at times with personal motives.

In all this situation, what has suffered the most is the historic urban fabric of the cities. The old areas of these historic cities are eventually turned into a chaotic fabric, which is an unscrupulous blend of modern and historic character. At times, the historic part has been demolished to raise modern apartments. This dangerous change in identity needs to be changed in India to retain the styles which were once celebrated and respected.

This research conducted a detailed study of Bhubaneswar's old city, which contains hundreds of temples, to identify the urban challenges it faces and to assess the community's opinion regarding these issues. It evaluates the impact of current urbanization on Odisha's temple towns. Its objectives were to first understand the historical evolution pattern of these settlements, which developed closely interconnected with the Kalinga (Odishan) style of temple architecture, by studying how modernization influences the relationship between temples and surrounding settlements. Second, the research seeks to assess the impact of current urban sprawl –

especially the rampant post-Independence growth—on the city's structure and settlement patterns. Third, it aims to evaluate current infrastructure needs, emphasizing the necessary mutual respect and integration between history and modern development. Finally, the research intends to formulate practical urban design guidelines and a framework to restrict unplanned development in heritage zones, offering solutions adaptable by the government. This will also aid in the formation of 'Urban Arts Commission' or a 'Heritage Commission' for the city for holistic development of these historic urban centers.

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2. Review of earlier works

2.1. Overview and Approach:

Several scholars have already undertaken research on the various topics revolving around the ancient settlement of Bhubaneswar. This majorly includes the evolution of Odisha as a state – how the region developed through the ages, transformation of temple architecture in Odisha to form a distinctive style known as the Odishan Temple Architecture. Some researchers have also highlighted on the remnants of the neolithic period proving that the settlements in this eastern state of India dates back to centuries. Comprehensive reports have been prepared by historians and sociologists, describing the social and morphological structure. Besides, eminent scholars such as Kak have anatomised the writing of British period writers to derive conclusions against the general foreign belief of India as subdued country. Tales of rich urban development, possible trade links have also been researched upon. Urban experts have also earlier established the possible linkage of urban growth in synchrony with the rituals of the temples, majorly in southern part of the country.

Bhubaneswar, following the development as capital city of Odisha has witness tremendous modernization and urbanization. This has led tremendous pressure on the historic settlements to adapt to the changes. There has been significant change in the old parts of the city with unplanned growth often leading to chaotic situations. Studies have been undertaken by experts to review the current situation of the city after urbanization and measures for improvement have also been identified in amalgamation to the heritage aspect. However, with the recent changes and rapid small scale industrial growth, there is a need to revisit these reports and develop plan which suit to the latest developments and align with the upcoming government policies.

2.2. Literature review

As a part of literature study, a comprehensive study of many of these relevant articles were conducted to analyse and correlate with the selected subject matter. A couple of literatures were studied which ally with the topic. The papers were sorted into three baskets comprising:

- a. Historical background of Temple towns in Odisha
- b. Urbanisation trend in Odisha
- c. Impact of urbanisation on the Temple Towns.

A detailed review of those articles is presented in the following parts.

2.2.1. Historical background of Temple towns in Odisha

Kak, 2005, Analyses the essays and articles of Anand Coomaraswamy and Louis Renou on Indian art and architecture. It also refers to prehistoric data on art and architecture

With a focus on the ancient and early medieval eras, this article provides a thorough examination of the beginnings and evolution of Indian architecture and art. This academic study looks at how artistic expressions, architectural forms, and the socioreligious settings that influenced them interact. The author's research offers a thorough grasp of the visual and cultural legacy of early India by addressing a variety of facets of Indian architecture and art, spanning from the early Indus Valley Civilization to the classical Gupta period and beyond.

The author starts with the Indus Valley Civilization (c. 3300–1300 BCE), emphasizing its creative accomplishments, innovative architectural designs, and innovative urban planning. Mohenjo-Daro and Harappa are known for their intricate grid plans, intricate drainage systems, and colossal buildings like as the Great Bath. This era's artwork, which includes ceramics, seals, and terracotta figurines, exhibits a high level of artistic sensitivity and competence. He highlights the way that cultural symbols and motifs have persisted from the Indus Valley to later Indian architecture and art.

Time Periods: Vedic and Post-Vedic There have been major shifts in social and religious systems between the Indus Valley Civilization and the Vedic period (c. 1500–600 BCE), and these changes can be seen in the art and architecture of the time. The author delves into the geometric accuracy of the Vedic sacrificial altars, known as Yajnas, and how they served as the model for later temple design. Urban settlements grew during the post-Vedic era, and early wooden constructions were built; many of these structures are known from archaeological and textual evidence.

Mauryan Art and Architecture : The reign of Emperor Ashoka during the Mauryan period (c. 322–185 BCE) is significant in Indian architectural and artistic history. Kak
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describes the contributions made during this time, which include the building of pillars, stupas, and rock-cut caverns. The elaborate capitals and polished sandstone of the Ashokan pillars serve as prime examples of the excellent caliber of workmanship. The stupas are important because they symbolize the Buddhist universe, especially the Great Stupa at Sanchi. The first noteworthy examples of Indian sculpture and relief art also appeared around this time.

Architecture with a Rock Cut: Rock-cut architecture flourished from the Mauryan period through the Gupta dynasty (c. 4–6th century CE), and the author offers a thorough description of this architectural style. Masterpieces of this genre are the rock-cut caves at Ajanta, Ellora, and Elephanta, which feature complex facades, intricate interiors, and superb sculptures. With their astounding murals, the Ajanta caves demonstrate the narrative art of early Buddhism and demonstrate the period's artistic and technical excellence.

The evolution of temple architecture is one of the main areas of focus. He charts the development of basic shrines into intricate temple constructions, emphasizing the centuries-long improvements in architecture and iconography. The development of the Nagara (North Indian) and Dravida (South Indian) temple architectural styles is especially noteworthy about the Gupta era. He studies the architectural features of temples, including the Mandapa (pillared hall), Shikhara (tower), and Garbhagriha (sanctum sanctorum), as well as their symbolic significance. The architectural significance and creative decorations of temples such as the Shore Temple in Mahabalipuram and the Dashavatara Temple in Deogarh are extensively addressed. The author explores the rich iconographic traditions of ancient Indian art, elucidating the cosmic principles, mythological stories, and symbolic images of deities. He examines Buddhist and Jain iconography in addition to the imagery of prominent Hindu deities like Shiva, Vishnu, and Durga. The application of symbols like the trishula (trident), lotus, and chakra (wheel) is examined in relation to their philosophical and religious meanings. Kak highlights how these symbols endure and change over time in many places and eras.

Kak's thesis focuses mostly on the aesthetic elements that underpin the works of early Indian art. He examines how the ideas of harmony, balance, and beauty are expressed in traditional Indian writings such as the Shilpa and Natya Shastras. Early Indian art has a profound awareness of aesthetics and a refined creative vision through its portrayal of human beings, nature, and divinities. The author highlights the geographical variances and local customs that enhanced Indian art as she explores the stylistic development of sculpture, painting, and decorative arts. The book offers a thorough survey of the evolution of Indian architecture and art from antiquity to the early medieval period. It reveals the complex relationships between creative expressions, early Indian socio-religious contexts, and architectural forms through research and in-depth analysis.

***Inference drawn:** This article provides a thorough examination of the artistic and architectural accomplishments of ancient India in addition to highlighting the larger philosophical and cultural currents that influenced them.*

Das, 2019 in his paper makes the listing of the historic towns of Odisha which have been mentioned in the various historic documents.

The Mahabharata makes the earliest reference to Kalinga and Odra. The Epic mentions about this land and its sacred river Vaitarani and Goddess Viraja. On the other hand, the Ramayana refers to Kalinganagara situated to the west of river Gomati and refers to the Gandhamardana and Utkala. Further, different Puranas like Vayu Purana, Matsya Purana, Bhagavata, Harivamsa Purana and Vishnu Purana etc. throw light on Kalinga and Utkala and legendary kings. The Kapila Samhita and Prachi Mahatmya are also considered as the sources of Odishan history.

The Jaina literature contain descriptions of Kalinga and Utkala. The Buddhist literature also reflects the history of ancient Odisha. The foreign accounts also give a good account of knowledge on ancient Kalinga. The most valuable of the foreign accounts is that of the Chinese pilgrim Hiuen Tsang who visited Odisha in 638-39 AD. Inscriptions play a very important part in shaping the history of Odisha. We find the inscriptions in different forms and at different places of Odisha.

The region now known as Odisha, was known in ancient times under various names, the most prominent of which were Kalinga, Utkala, Odra, Tosali, Kangoda and Kosala. Each of them during its historical existence found mention in different sources which provide interesting accounts about it.

The fertile coastal plains stretching from the mouth of the river Ganges up to Godavari, with mountains and forests, gave a natural boundary to Kalinga. Dantapura, one of the early capitals of Kalinga, has not been identified. Kalinganagara which was capital of Kharavela, has tentatively been identified with Sisupalagarh near Bhubaneswar. Kalinganagara ceased to be the capital of the Gangas when Chodaganga conquered Odisha about A.D. 1110 and he chose Kataka (Cuttack), more centrally situated in his extended kingdom, as his new capital.

The territory of Utkala has been narrated in various Puranas. The earliest capital of Utkala was Viraja as is evidenced by the Soro Copper Plates. This place has been identified with Jajpur where the shrine of Viraja still exists.

The present name of Odisha has been derived from the name Odra or Udra or Odraka. It appears as Urshin or Ursfin in the accounts of the Muslim geographers of the ninth and tenth century A.D. It appears that it was a big kingdom occupying the coastal strip up to the Puri district from which the kingdom of Kongoda began.

Kangoda was another geographical unit of ancient Odisha. This was a Mandala state and flourished in the sixth-seventh century A.D. It continued as parts of Kalinga and Odra. The Sailodbhavas gave this Kongoda Mandala (undivided Ganjam district) its true shape. The Chinese pilgrim Hiuen Tsang who visited Kongoda about 638 A. D. mentioned that the country contained some tens of towns from the slope of the hills to the edge of the sea.

Kosala as a geographical unit was existent in ancient Odisha. The earliest depiction of Kosala is found in the Parisistha of the Atharvaveda. The Epics and the Puranas also throw light on its ancient history. It was named after- like Kalinga, Utkala and Odra - ancient people called Kosalas. The kingdom of Kosala was divided into two units- Uttara (north) and Daksina (south) from very early time. Hiuen Tsang who visited Kosala in 639 A.D. described the kingdom. It may be presumed that Kosala comprised

the districts of Bilaspur and Raipur in Madhya Pradesh along with the undivided districts of Sundargarh, Sambalpur and Bolangir in Odisha. The Chauhans rose to political prominence and made Sambalpur the centre of their political activities. They became the overlord eighteen states (Atharagarha) comprising almost the whole Kosala country described by the Chinese pilgrim Hiuen Tsang.

Inference drawn: This paper identifies the capitals of these princely states which were the important seat of power and urban centres. Thus, the important historic towns of Odisha are **Bhubaneswar, Puri, Cuttack, Ganjam, Sambalpur and Jajpur.**

Patra & Patra, (2004) have made an analysis of the archaeological investigations carried out in various parts of the state defining the historic settlements while establishing the maritime linkage with various parts of the world.

Odisha has a rich maritime heritage. Archaeological digs in Odisha have uncovered numerous ports like Tamralipti, Chelitalo/Manikapatna, Khalkattapatna, Palur/Dantapura, and Kalingapatnam, along with urban centers such as Sisupalagarh, Dhauli, Jaugarh, and Golbai. These discoveries firmly establish ancient Odisha's significant maritime activity, including interaction with Southeast Asia and the Western world.

In the early centuries BCE, economic transformations driven by the adoption of iron and advancements in agriculture led to the rise of urban settlements like Tosali (Dhauli) and Samapa (Jaugada). These urban hubs were crucial in shaping ancient Odisha's destiny and its foreign relations through overseas trade. Evidence of these coastal urban settlements comes from excavations at Dhauli and Jaugada, which were also the political centers of Kalinga during Ashoka's Mauryan period.

The growth of urbanization and these prominent urban centers likely encouraged Kalingan merchants to engage in trans-oceanic commerce. Excavations at Sisupalagarh provide concrete proof of a well-planned, early historical fortified city in Odisha. This site was a roughly square fort, with each side measuring about three-quarters of a mile long, enclosing an area slightly over half a square mile.

Inference drawn: These important civic centers / urban centers of ancient kingdoms of Odisha had a flourishing trade network with various parts of the world. Trade network is generally

established when the kingdom has a well-established settlement with surplus to share it in trade. The excavated material remains prove ports having contact with many countries.

Mishra (2011) highlights on the early social formations and economic development of Odisha.

An important conclusion derived regarding the early social formations in Odisha is the non-existence of caste proliferation in the region until the 10th and 11th century A.D, essentially due to the fact that there was dominance of the tribal population in the plains.

Agriculture formed the basis of the economic development of Odisha in the prehistoric times. It was eventually converted into urban economy, proved by the Neolithic settlements in Odisha and their material culture.

The Mauryan occupation of Kalinga as its state further led to the process of urbanization. It further accelerated during the time of settlements such as Sishupalgarh, Juagarh, Asurgarh and Radhanagar. The economic factors such as development of trade, arts and crafts are often proved by the recovery of coins, knobbed ware from different sites of Odisha, coastal ports, trade routes and also archaeological findings of pottery, beads, metal objects and coins from early historical sites. All of them contributed to the development of urbanization in early historic Odisha.

Odisha was mainly an agrarian economy in its very early formations and eventually the kingdoms were converted into an urban economy. Surprisingly, there was no caste system existing in prehistoric times. Development of urban centers in Odisha was mainly attributed to the rise in economic stability of the settlements.

He mentions that the Bondas tribe of Odisha claim to be the original inhabitants of their current land, and continue to live the same way paying no heed to civilization. However, anyone of them who has moved out of the tribe have never returned back. This may prove precedence of the migration of people from the uplands to the plains of Odisha, leading a non-nomadic and stationary life, undertaking farming. With the

eventual immigration of Brahmanas from the north, commencing from the Mauryan rule – as mentioned in the Ashokan inscriptions post the famous Kalinga war, there has been development of temple construction and urbanization synonymous to the early historic culture of Odisha.

Inference drawn: Odisha had majorly tribal population. But, eventual immigration, starting with the Ashokan annex of Odisha, changed the socio-cultural profile of the state with the propagation of caste system.

Mishra, Brundabana (2012), highlights on the social structure of western part of Odisha from 16th to 18th century

The social structure of Western Odisha – mainly consisting of the 18 garhs or forts which include the undivided districts of Sambalpur, Sundargarh, Bolangir, Deogarh, Boudh as well as the Raigarh in current Chattisgarh, was majorly divided into tribal and non-tribal structure. The rulers, Chauhans are believed to be 14th century migrants from current Uttar Pradesh. They formed a coalition amongst themselves and in 17th century, Sambalpur was the capital of the Kingdom, which was termed as Kosala.

There was no central authority rule in the state of Kosala and most of the regions were under the control of the tribals. The Chauhans and tribals maintained equilibrium amongst themselves. Eventually, the Chauhans positioned the tribals in the administrative structure leading to development of a hierarchical order in the society.

While the Chauhans gave importance to the tribals, they also invited sects from outside to settle in Kosala, further improving the societal system. However there was no strict division of the profession based on the norms of the regular four folded system of the society and the communities were free to choose their profession under the Chauhan rule.

Inference drawn: With such a prolific social structure, there is a clear understanding of well formed settlement which cherished in the western part of present day Odisha.

Sterling, 1904 (reprint), provides the earliest British account description of various historic findings in Odisha

Odisha's territorial boundaries have shifted considerably throughout its history, making them notoriously difficult to define.

Extent During the Ganga Dynasty

For nearly four centuries under the Ganga dynasty, Odisha's approximate boundaries were:

- North: A line from Tirveni ghat (above Hoogly) through Bishnupur to the Patna frontier.
- East: The sea.
- South: The Godavari River.

West: A line extending from Singhbhum to Sonapur, bordering Gangpur, Sambalpur and its dependencies, then through Jaypur and the Godavari.

During the peak of the Odishan monarchy, its territory was even more expansive, encompassing all of Midnapore, Cuttack, Ganjam, and Vishakapatnam, along with parts of Hoogly and Rajamundry, and a portion of the hilly, forested region of Gondwana. However, shortly after Emperor Akbar's reign, the Qutb Shahis of Golconda successfully encroached upon and dismembered the area south of Raghunathpur from Odisha.

Geography and Agriculture

Historically, western Odisha was a vast, largely unexplored region dominated by hills and forests, interspersed with fertile plains and valleys. To the east, a flat, alluvial plain stretched from the foothills to the sea. This plain is remarkably uniform, lacking any rocky elevations or stones, except for scattered limestone nodules and beds of iron clay on the western frontier. Despite this, the central and southern parts of Odisha produced abundant crops of pulse, millet, and vegetable oils during the colder months.

The text also mentions a popular belief that Odisha's inhabitants are assured of a place in the spiritual world, and visitors who bathe in its sacred rivers can have their sins forgiven, no matter how great. Cotton, Sugarcane, and Tobacco were everywhere south of the river Baitarani.

Odisha is rich in diverse and valuable mineral resources. Iron ore is particularly abundant in the Cuttack hills and was primarily smelted in the regions of Dhenkanal, Angul, and Mayurbhanj. Interestingly, some rivers in Dhenkanal and Keonjhar are even rumored to have golden sands.

Historical Monuments:

The ancient capital of the Gajapati Rajas features only one surviving monument: the Barabati fortress. This structure was likely built in the 14th century by Raja Anang Bhim Deo, although some attribute its construction to Telinga Mukund Deo, the last independent sovereign of Odisha, while others suggest it dates back to the Kesari dynasty.

Regarding Muslim architecture in the capital, two notable sites stand out: a small mosque built by Ikram Khan, a governor during Aurangzeb's reign, located in the town's center, and the Kadam Rasool. The latter is an antique-looking edifice set within a beautiful garden, believed to house relics of the prophet.

Puri Jagannath and Utkala's Holy Significance

The town of Puri Jagannath owes its entire size and importance to its connection with its revered temple. Every inch of the town was considered holy, with all land dedicated to services related to the temple. The main street was almost entirely lined with Mathas (religious establishments) made of masonry, featuring low, pillared verandas and interspersed with trees. This wide street led majestically to the temple at its southern end. Lush gardens and groves surrounded the town on the land side, yielding the province's finest fruit.

Utkala (ancient Odisha) was widely believed to be an inherently sacred region. It contains four particularly holy pilgrimage sites:

- The Ekamra Kshetra

- The Vishnu or Pursottem Khetra
- The Arka or Padma Khetra
- The Birjai or Parvati Khetra

These areas are home to many curious and fascinating religious antiquities of the province.

About sixteen miles from Cuttack, a traveler's attention is drawn to a towering, stone structure emerging from the thickets bordering the Khorda frontier. A path winds through the woods for about six miles, leading to a gently rising rocky elevation, or Tangi, composed of iron clay beds. This site marks the center of a ruined city, entirely made up of deserted and dismantled towers and temples dedicated to the worship of Shiva. Among these ruins, the great Pagoda of the Lingraj stands out, notable for its unique shape, impressive size, height, and superior architectural style.

From 617 to 660 AD, Bhubaneswar served as a capital city and the seat of government for the Kesari Rajas. This is evident from the countless temples concentrated within the sacred Panch Kos area.

Grandeur of a Bygone Era

In its prime, Bhubaneswar would have been one of India's grandest cities. Standing near the main Pagoda, one could easily see forty to fifty stone towers in any direction. Local tradition claims that over seven thousand places of worship dedicated to Mahadev and a crore (ten million) of lingams once existed within and around the city. The remaining vestiges certainly support the belief that hundreds of such structures were present during its most flourishing period. Many of these temples were still in a decent state of preservation at the time, despite being neglected and deserted. What makes the site so remarkable isn't just the sheer number of temples, but also their striking style, size, and intricate decorations, which significantly enhance their wonder and appeal.

Architectural Marvels

These temples were constructed from either reddish granite resembling sandstone or from the abundant freestone found in the nearby hills. They are typically tower-

shaped, rounded towards the summit, with additional structures attached to a square enclosure whose walls are now mostly in ruins. Their height is never less than fifty or sixty feet, with the taller towers reaching between one hundred and fifty to one hundred and eighty feet. Notably, no wooden beams were used in their construction. Instead, stones were held together with iron clamps, and iron beams and pillars were employed only where absolutely necessary. Generally, architects created roofs by laying horizontal layers of stone, each projecting slightly beyond the last like inverted steps, until the sides met closely enough at the summit to allow for capstones.

The exteriors of these buildings were richly adorned with elaborate sculptures, depicting a vast array of curious relics such as bulls, lingams, and other symbols associated with Mahadev's worship. Figures of Ganesh, Hanuman, and various forms of Shiva and Parvati were common, as were representations of Durga or Kali, Kartikeya (the god of war) with his peacock, Kumari (the female energy of Kartikeya), and the Narasingha and Hainan Avatars.

Since the major temples in Bhubaneswar and throughout the province share a consistent architectural style, a detailed description of the main Lingaraj Pagoda's layout will suffice.

The Lingaraj complex includes numerous smaller towers and temples that, while less prominent than the main structure, contribute to the overall grandeur through their consistent style and sheer number, and thus don't require individual descriptions. All of these structures are lavishly decorated with intricate sculptures, featuring finely crafted cornices, headings, arabesque and reticulated designs, and clusters of pilasters. These are interspersed with figures of humans, animals, serpents, and flowers, arranged in such a vast and varied array of patterns that it's nearly impossible for the eye to discern a single, distinct design.

The Lingaraj temple in Bhubaneswar stands as not only the most exquisite ancient monument in the province but also, undeniably, its oldest. Its construction spanned forty-three years, with both local tradition and historical records placing its completion in 357 AD.

The Udayagiri-Khandagiri Caves

Approximately five miles west of Bhubaneswar, near the village of Jagmara and still within the sacred Ekamra Khetra, lies a cluster of four small hills, ranging from 150 to 200 feet in height. These hills, named Udayagiri, Deulagiri, Nilgiri, and Khandagiri, are composed of multi-colored, textured siliceous sandstone and are remarkably perforated with small caves arranged in two or three irregular tiers. Each cave is large enough to comfortably accommodate one or two people in a sitting position. Some of these appear to be natural cavities slightly enhanced by human hands, while others were entirely man-made, and all are adorned with grotesque carvings and embellishments.

Raja Lalat Indra Kesari's Palace (Udayagiri Hill)

A short distance up the Giri hill (likely referring to Udayagiri), one can find the purported palace of the renowned Raja Lalat Indra Kesari, considered the main attraction of the area. It consists of an open court formed by a sheer sandstone rock face, roughly forty feet high, with projecting shoulders on either side. Rows of small chambers are excavated into each face, arranged in two stories and separated by a protruding terrace. Both the exterior surfaces and the inner walls of these chambers are decorated with crudely sculpted cornices, pilasters, figures, and various designs. The entire complex bears a faint, miniature resemblance to the famous cavern temples in southwestern India. This site dates back to the time of Buddha and was last inhabited by the Rani (queen) of Raja Lalat Indra Kesari, who was a patron of Buddhism. Many curious tales are told about the difficulties she faced due to her unorthodox beliefs and how she was eventually converted to the traditional system of worship.

The Vishnu or Purushotama Kshetra technically stretches from the Baitarini River to the Rushikulya River at Ganjam. However, its most sacred section is a five-kos (approximately 10-mile) radius, fantastically known as the Sankh Nabhi Mandal. Within this central area, on a low ridge of sand hills grandly named Nilgiri or Nilachal (blue mountain), stands the famous Jagannath temple, famously called "that mighty Pagoda, the mirror of all wickedness and idolatry."

The Architecture of Jagannath Temple

While the Jagannath temple closely resembles the great Pagoda at Bhubaneswar in its form and layout, it boasts a superior location. Its sheer height and massive masonry certainly create an imposing appearance. The current structure was completed in 1198 AD, costing between forty and fifty lakhs of Rupees, under the supervision of the minister of Raja Anang Bhim Deo, who was arguably the most illustrious of Odisha's Gajapati princes.

It's perplexing that in an era where architects clearly possessed skill and taste, and were generally extravagant with sculpted ornamentation, so little effort was seemingly put into decorating and finishing this sacred and enormous edifice. Its appearance has further deteriorated in recent years. An exterior coating of lime wash has mostly worn off, leaving only stains and patches, and even more detrimentally, a current barbaric practice involves marking parts of the sculpture with red paint.

The Arka or Padma Kshetra is notable for housing the ruins of the famous Sun temple, known on maps as the Black Pagoda. This temple is situated amidst the coastal sand hills near the old village of Konark, eighteen miles north of Jagannath Puri.

Konark Sun Temple: A Majestic Ruin

Currently, only the Jagamohan (antechamber) of the Konark temple remains in reasonably good condition. The main tower was destroyed by some immense force, possibly an earthquake or lightning strike, and its collapse seems to have damaged the adjacent side of the surviving edifice. However, a small section, approximately 120 feet tall, still stands, giving the ruin a distinctive, ship-like appearance when viewed from a distance. The temple's outer enclosures have long since vanished, and the Bhog Mandap (offering hall) is now nothing more than a heap of ruins, completely buried under a sand hill.

Even in its current ruined state, the Black Pagoda is a remarkable and beautiful example of ancient Hindu temple architecture. Because it has been deserted for so

long, it offers a unique opportunity to study the striking peculiarities of this architectural style without interruption.

Birjai or Parbati Kshetra: Jajpur's Sacred Heritage

The Birjai or Parbati Kshetra encompasses the area stretching five kos around the village of Jajpur, located on the banks of the Baitarini River. Its sanctity, as is common, is based on a variety of fanciful notions and ancient traditions. The numerous stone temples on both sides of the Baitarini, mostly built in a highly respectable architectural style, attest to the place's historical significance. Indeed, history confirms that Jajpur was once one of the capitals of the Odishan monarchy.

The surroundings of Jajpur offer much to intrigue visitors, with its temples, various styles of khambas (columns), and impressive remnants of statuary. An inscription found on one of the pillars is said to be identical in character to one found in the Khandigiri caves of Khorda. The most uniquely interesting objects in Jajpur are the stone-carved images of certain Hindu goddesses.

Odisha's bridges are among the most commendable, though not the most lavish, enduring monuments from its native rulers. Many of these structures are still in excellent condition throughout the province. Some notable examples I've seen include the bridge between Simleah and Soro, which spans fourteen channels; the Atharah Nalah (eighteen channels) bridge at Puri; the Charnalah in the same area; the bridge at Delang; and another over the Daya River, located between Khorda and Pipili.

***Inference drawn:** The travel account of Sterling, being the earliest British account of Odisha, gives a clear description of the stage of urban development in the major urban centres of Odisha. This is helpful for the archival literature depicting the condition of structures.*

Fergusson (1910 Reprint) gives a vivid description of his views and history of Odisha temples and settlements in his book during his travel in the mid-19th century.

Following the 16th century, most of these kingdoms were war struck and were majorly involved in saving or expansion of their kingdoms. With the advent of Marathas and Mughals in the 17th century, there was a lot of political instability in the state of

Odisha across all kingdoms. However, Fergusson mentions that some of the settlements in Odisha were untouched by the Bengal Sultanate and Mughals owing to its remoteness. The entry of British into Odisha led to many revolts in these kingdoms which were suppressed cruelly and in result many of these settlements may have been damaged. James Fergusson also associates the poor state of the temples and the settlements to the unthoughtful and greedy nature of the British rulers who have smuggled the riches from this state.

One of the most marked and striking peculiarities of Odishan architecture is the distinct and almost absolute contrast it presents to the style of the Dravidian at the southern end of the peninsula. The curved outline of the towers or vimanas has already been remarked upon, but, besides this, no Odishan towers present the smallest trace of any storeyed or even steplike arrangement, which is so universal further south, and the crowning member is never a dome, nor a reminiscence of one. Even more remarkable than this, is the fact that the Odishan style is almost entirely astylar.

There generally are other shrines within the enclosures of the great temples, but they are always kept subordinate, and the temple itself towers over everything to even a greater extent, giving a unity and purpose to the whole design, so frequently wanting in the south.

Owing to its remoteness from the seats of Bengal Sultans in 16th century, Odisha almost entirely escaped the ravages which devastated the principal Hindu cities in the earlier and more intolerant age of their power. The first serious invasion of Odisha was only made about 1510 by 'Alau-d-din Hasain Shah, King of Bengal, whose army sacked Katak and plundered Puri, but was driven back; and it was not till 1567- 1568 that Sulaiman Khan Kararani, the Afghan Viceroy of Bengal, finally defeated the Odisha king at Jajpur. Soon after it was annexed by Akbar, and after four more years of contests it became a province of his empire in 1578, after which further outrages were hardly to be feared.

At Jajpur the Bengal Sultanate and Mughals had already wreaked their vengeance on all that was Hindu; but elsewhere the monuments were left more nearly intact than

any other group in the north of India. Neither at Bhubaneswar nor at Puri or Konark are marked traces of their violence. In later times Odisha remains have suffered from the sordid proceedings of the Public Works Department, which destroyed the fort at Barbati and other public buildings, to mend roads or to save some money in erecting a lighthouse at False Point. Further injury has been done by the antiquarian zeal of the officers who removed some of the best statues of the Rajarani temple, and by the vandals who pulled down the Navagraha sculpture from the Konark temple. Lastly, and worst of all, by the Archaeological Survey, a few years ago, which caused the interior of the mandap of this famous monument to be completely filled up with stones and sand and so "shut up forever."

Besides their immunity from the ordinary causes of destruction of Hindu buildings, the Odisha group forms in itself one of the most complete and interesting in all India. Jaipur, on the Baitarani, was one of the old capitals of the province, and even now contains temples which, from the squareness of their forms, may be old, but, if so, they have been so completely disguised by a thick coating of plaster, that their carvings are entirely obliterated, and there is nothing by which their age can be determined. The place was the scene of the struggle in the 16th century between the Musalmans and Hindus for the mastery of the province; and, under Sulaiman and his Afghan soldiers, it was reduced to ruins. The ruined structures became a quarry for building materials, and the handsome mosque built by Nawab Abu Nasir Khan in 1681 was raised out of the ancient Hindu remains. There is one pillar, however, still standing, which deserves to be illustrated as one of the most pleasing examples of its class in India.

Katak, according to tradition, became the capital of the country in A.D. 989-1006, when Markat Kesari built a stone revetment to protect the site from encroachment of the river. It too, however, has suffered, first from the intolerant bigotry of the Bengal Sultans, and afterwards from the solid indifference of the British rulers, so that very little remains. But for this the great palace of Mukund Deo, the contemporary of Akbar, might still remain to us in such a state at least as to be intelligible. Abul Fazl's description of this palace, however, has been misunderstood by the translators, who have represented it as "consisting of nine storeys," instead of nine courts or enclosures.

" The first enclosure was for elephants, camels, and horses; the second for artillery and military stores were also were quarters for the guards and other attendants ; the third was occupied by porters and watchmen ; the fourth was appropriated for the several artificers ; the kitchens made the fifth range ; the sixth contained the Raja's public apartments; the seventh was for the transaction of private business ; the eighth was where the women resided ; and the ninth was the Raja's sleeping apartment." " To the south," he adds," of this palace is a very ancient Hindu temple."

While we lack information about the civil architecture of Odisha's Indo-Aryans, a group of engineering feats sheds light on the period's artistic prowess. Hindus historically avoided using arches unless absolutely necessary. Though Muslim rulers later introduced them to civil buildings, Hindus to this day largely shun them in temples.

Ancient Bridges of Odisha

Interestingly, 13th-century Odisha saw the construction of numerous bridges across the province, none of which utilized a true arch. The Athara-nala bridge at Puri, described by Stirling as the finest in the province still in use, exemplifies this. He attributes its construction to Kabir Narsingh-deva II around 1280. This bridge is 278 feet long between its abutments, featuring nineteen spans ranging from 7 to 16 feet wide, and a roadway 38 feet wide. While seemingly unscientific by modern standards, many of these old bridges remain functional, unlike many contemporary constructions built from salvaged temple and palace ruins, which have mysteriously succumbed to forces as if cursed.

Mukhalingam: A Wilderness of Ruins

Another significant group of temples is found at Mukhalingam in the Ganjam district, a pilgrimage site adjacent to the town of Nagarakatakam. This was the original site of Kalinganagara, the ancient capital of the Eastern Ganga dynasty of Kalinga, both before and for some time after their 11th-century conquest of Odisha.

The area is often described as a "wilderness of ruins." The largest and most complete temple here consists of a shrine and a mandap (hall) with two rows of three plain

pillars each supporting the roof. The exterior of this roof exhibits the typical Odishan form—somewhat flat with three finials aligned across it. The shrine is topped by a tower, or sikhara, composed of numerous thin molded courses, crowned by a double amalaka (a fluted stone disc) with a domed apex and a small finial. The eastern doorway is deeply recessed, featuring two wide frames around the entrance. The inner frame is set significantly deeper than the outer, and both are richly carved with floral patterns on their faces and lintels. This entrance is flanked by square jambs, sculpted with figures in compartments on their front, supporting a projecting lintel. Even more prominent on each side is a richly carved pilaster with Gupta-type capitals, supporting an upper lintel densely packed with figures.

Jajpur and Puri were the settlements mostly affected by the attack of the Bengal Sultanate and Mughals. Cuttack's Barabati Fort was mostly damaged by the British – a clear description of the palace can be ascertained from the description of Abu Fazl which has been inferred by James. The ruins of a temple complex of Ganjam depicting its glorious past is also depicted. There is hardly any mention of Bhubaneswar clearly depicting that it was left neglected during the British rule and thus no significant urban development took place here.

***Inference drawn:** The account of Fergusson is considered to be one of the most accurate description of the state condition in the early phases of British rule. The description can often be considered as references to the situation of the state, its lost glory and ruinous state of affairs which nevertheless depicted the tales of urban affairs of Cuttack, Bhubaneswar, Konark, Jajpur, Puri and Ganjam along with its temple settlements in Odisha.*

2.2.2. Urbanization Trend in Odisha

Garnayak, D.B. (2007) makes an attempt to depict the evolution of the Odishan style of Temple Architecture

Temple architecture in India began in the Mauryan period (3rd century BC) and gained significant traction during the Gupta period. Texts on Kalingan temples describe three types: rekha deula, pidha deula, and khakhara deula, with the first two

often forming parts of the same temple complex. The Odishan style is considered a sub-style of the Nagara style found in north Indian temples.

Evolution of Odishan Temple Architecture

Odishan temples demonstrate a clear evolutionary progression, from the Parasuramesvara to the Lingaraja, via the Muktesvara and Vaital, ultimately culminating in the grand structures of Puri and the colossal Konark. This evolution can be categorized into four distinct phases of temple construction:

- **Formative Phase (6th to early 9th century AD):** During the rule of the Sailodbhavas and the early Bhauma-karas, temples were typically small to moderate in height.
- **Transitional Phase (late 9th to early 11th century AD):** This period, under the later Bhauma-karas and the first half of the Somavamsis (Kesharis), saw the introduction of explicit erotic sculptures, influenced by the Vajrayana philosophy.
- **Mature Phase (11th to 13th century AD):** Spanning the Somavamsi and Ganga rule, this era represents the pinnacle of the Odishan temple style.
- **Phase of Decadence (14th to 16th century AD):** Following the Gangas, under the Suryavamsi-Gajapatis, temple building activities entered a period of decline. This was due to the political instability in the region.

***Inference drawn:** Temple development are always associated with the settlements around it or vice versa. Thus, the periods can also be considered for growth and decadence of the historic settlements.*

Mishra, 2005, Analyses the development of temples from 8th to 17th century, defining how the temple evolved through centuries

The author provides a thorough analysis of the growth and changes that Odisha's temple architecture underwent between the sixth and the sixteenth centuries AD. The book explores the religious, cultural, and historical factors that influenced this region's architectural forms. Formative, transitional, mature, and decadent are the four distinct

phases into which Dr. Mishra divides the evolution. A framework for comprehending the structural and artistic alterations in temple building across centuries is provided by this classification. The early Bhaumakaras and Sailodbhavas' dominance characterize this formative age. Small to modestly sized temple construction is what defines this era. Lakshmaneswar, Bharateswar, Satrughaneswar, Swarnajaleswar, Parsurameswar, Mohini, and Kapalini temples are a few notable examples. The best-preserved example from this era is the Parsurameswar Temple, which dates to the 7th century. It has a rectangular Jagamohana (assembly hall) with a terraced roof that slopes in two levels, as well as a triratha vimana with a rekha sikhara (a linear spire). The pabhaga (foot), jangha (body), and baranda (superstructure) are the three main elevational divisions seen in the triratha plan of the temples built during this time. Generally speaking, the sculptures are simple and lack the intricacy of subsequent times. Between the later Bhaumakaras and the early Somavamsis (Kesharis), the transitional period spans the late 9th and the first quarter of the 11th century. Vaital (Khakhara deula), Sisireswar, Markandeswar, and Bringesvara are among the temples from this era. This phase is most known for the widespread sensual sculptures that are influenced by Vajrayana Buddhism. One of the best examples of the transitional stage is the Mukteswar Temple in Bhubaneswar. Its finely carved details have earned it the title of "gem of Odishan architecture" on numerous occasions. The vimana (sanctum) and the jagamohana have been perfectly and naturally integrated in this temple, as opposed to being crudely overlapped in previous constructions. The mukhasala, or porch, evolved into a crucial component that reflected a more sophisticated architectural design. The mature period, which corresponds to the Ganga dynasty's control, is considered the best of Odisha's temple architecture. The Sun Temple in Konark and the Lingaraja Temple in Bhubaneswar, among other structures, are examples of this era. The 11th-century Lingaraja Temple is a prime example of the completely realized Kalinga architectural style. It has an enormous deul (sanctum) with a tall rekha sikhara, ornate carvings, and a roomy jagamohana with a ceiling shaped like a pyramid. The temple complex is embellished with an abundance of sculptural features and has several subsidiary shrines. Between the 14th and 16th centuries, Odisha's temple architecture reached its pinnacle during the

Suryavamsi-Gajapati dynasty. While temple building operations persisted, the opulence and magnitude of temple construction declined throughout this time. This phase's temples were less numerous and less ornate, but they nonetheless carried over the stylistic aspects from previous eras. The architectural elements, which mirrored the political and economic difficulties of the era, included less decoration and simpler patterns.

The article offers thorough explanations of the different architectural components that characterize temple architecture in Odisha. These include the temples' bada (base), gandi (body), and mastaka (head), which have evolved in intricacy and adornment yet remain consistent throughout phases. Usually, the bada is made up of several moldings, such as the pata (plank), kumbha (pot), and khura (foot). The gandi has a gentle curvature and is frequently embellished with angasikharas, which are little duplicates of the main spire. The beki (neck), amalaka (ribbed stone), khapuri (skull), kalasa (lucky pot), and ayudha (deity's weapon) make up the mastaka, or crowning element. An extra component seen in pidha deuls (tiered temples) is the ghanta (bell). The elaborate sculptures that adorn the temples are another noteworthy feature. The cultural and religious history of Odisha is intimately linked to the development of the region's temple architecture. Early temples are a reflection of the syncretic traditions of Saivism, Vaishnavism, and Shaktism; Tantric and Vajrayana Buddhist practices are evident in later times. The sponsorship of several dynasties, such as the Sailodbhavas, Bhaumakaras, Somavamsis, Gangas, and Suryavamsi-Gajapatis, also had an impact on the architectural advances. These monarchs encouraged the artists and craftspeople who built these architectural marvels in addition to commissioning the construction of temples.

Inference drawn: The article tells the story of the organic development of temple building over a millennium through in-depth study and vivid descriptions. While the article discusses architectural styles and dynastic periods, the changes described strongly suggest a corresponding growth in the size, complexity, and resource mobilization of the surrounding urban centers – cities like Bhubaneswar and Puri.

Chand, 2005, Describes the three styles of Odishan temple architecture - rekha deula, khakara deula, pidha deula.

The article, 'Odishan Temple Architecture' is an examination of the artistic, architectural, and cultural features of temple buildings in Odisha, India. From these temples' early beginnings in the sixth century, through their transitional phase in the ninth and tenth centuries, to their classical pinnacle between the eleventh and thirteenth centuries, the book painstakingly recounts their historical progression. The Deula building, which houses the Vimana (sanctum sanctorum), Jagamohana (assembly hall), Natamandira (festival hall), and Bhogamandapa (hall of offerings), is one of the distinctive architectural features of Odishan temples. We examine the architectural and functional relevance of each of these elements. With its complex carvings of mythological scenes and deities, the Vimana is distinguished by its curvilinear spire or pyramidal roof, while the Jagamohana, with its elaborate pillars and sculpted ceilings, functions as a venue for congregational activities. The significance of the Natamandira and Bhogamandapa in religious celebrations and offerings, respectively, is emphasized. The rich iconographic and sculptured components that adorn these temples—such as decorative motifs, mythological stories, statues of deities, and sensual sculptures—are explored in great detail in the book. These elements are presented as symbolic representations of cosmic principles and spiritual truths.

***Inference drawn:** The author additionally highlights the architectural and sculpture parts' symbolic meaning, presenting the temples as representations of cosmic principles and spiritual goals. The last chapters discuss the difficulties of maintaining and conserving these architectural wonders, arguing in favor of an all-encompassing strategy that incorporates government backing, community involvement, and scientific methodologies.*

Mohanty, 2003, Tries to establish the identity of Odisha with relation to the chronology of temples developed.

An in-depth examination of the ways in which studies on temple architecture and related topics have influenced the development and comprehension of Odisha's

regional identity can be found in this article. This academic study explores the architectural, cultural, religious, and historical significance of Odisha's temples, showing how these buildings have played a crucial role in forming the region's identity over many years. The book's format emphasizes the sociocultural and theological context that these temples represent while providing a thorough examination of how regional identity and temple architecture have interacted throughout time. The author starts out by giving a brief historical outline of Odisha, which was originally known as Kalinga, emphasizing the region's distinctive topography and culture. The book follows the evolution of temple building in Odisha starting in the early medieval era, highlighting the ways in which various dynasties, such as the Bhaumakaras, Somavamsis, and Gajapatis, shaped the architectural styles. Every dynasty made unique contributions to the construction of temples, which were a reflection of their cultural and religious interests, regional identity and architectural styles. The article carefully divides Odishan temple architecture into many historical eras and architectural styles, emphasizing the ways in which these styles shape the local character. In-depth discussion is given to the Kalinga style, which is distinguished by its three distinct deula structures: Rekha, Pidha, and Khakhara.

The author explores the symbolism found in Odishan temple architecture, elucidating how different architectural features and sculptures represent the locals' cosmic and spiritual beliefs. In-depth discussions are held over the usage of certain motifs like the lotus and the lion, the tiered structure symbolizing several realms of existence, and the alignment of temple structures with the cardinal directions. It is demonstrated that these components stand for both the socio-political ethos of the day and religious ideas.

The article devotes a large amount of its content to discussing the impact of religion on Odishan temple design. The author talks about how the architecture of temples and their iconography in Odisha have been impacted by various religious traditions, such as Buddhism, Jainism, and Hinduism. One important feature of the character of the region is the syncretic nature of Odishan temples, wherein aspects of many religious traditions are often intermingled. The book looks at certain temples where

the syncretism is visible, including the Bhubaneswar-based Lingaraja Temple, which combines Shakta, Vaishnava, and Shaiva features. The author highlights the value of scholarly and archeological research in figuring out Odisha's unique regional identity. There is a full discussion of the roles played by academics, historians, and archaeologists in recording, conserving, and understanding the temple architecture. The book presents important research and conclusions that have made a substantial contribution to our current knowledge of Odishan temple architecture and its function in forming regional identity. Several well-known Odisha temples, including the Sun Temple at Konark, the Jagannath Temple in Puri, and the Mukteswara Temple in Bhubaneswar, are covered in-depth case studies in this book. These case studies shed light on the temples' architectural characteristics, historical relevance, and cultural influence. Mohanty utilizes these instances to highlight the more general topics covered in the book, such as the relationship between regional identity, architecture, and religion.

***Inference drawn:** Mohanty discusses the difficulties in maintaining Odishan temple architecture in the contemporary day in the last few chapters. The risks posed by urbanization, natural degradation, and insufficient preservation measures are covered in the book. In addition to protecting the temples' tangible assets, The author is an advocate of a comprehensive conservation strategy that takes into account the intangible cultural legacy connected to these sites. A critical analysis is conducted of the roles that local communities, international organizations, and government agencies play in conservation efforts.*

Sarangi, 2017, highlights on the components of a temple which is developed from the practices in rural areas of Odisha

An in-depth analysis of how indigenous architectural traditions have influenced the evolution of Odisha's temple forms can be found in Shaswat Sekhar Sarangi's Influence of Vernacular Architecture in Evolution of Temple Forms of Odisha. The book explores the technical, cultural, and historical facets of this development, providing insights on the persistence and change of local architectural traditions. According to Sarangi's research, the evolution of Odisha's temple architecture has

been greatly impacted by vernacular architecture, which is distinguished by regional materials, methods, and cultural expressions. This has made Odisha's temple architecture distinct and culturally meaningful. Sarangi starts off by placing Odisha's architectural legacy in the perspective of its past and present. He describes the history of the area from prehistoric times to the Middle Ages, emphasizing the principal dynasties that supported the building of temples, including the Kalingas, the Eastern Gangas, and the Gajapatis. The book explores how these dynasties made it easier for regional architectural traditions to combine with more general Indian forms, resulting in a unique shape. The author highlights the significance of vernacular architecture in this process, characterizing it as the native building techniques that developed in response to the local population's demands, available resources, and natural circumstances. He investigates how traditional building methods combined with locally accessible materials like granite, sandstone, and laterite served as the foundation for Odisha's vernacular architecture.

Sarangi looks at the early Odisha temples, which had comparatively straightforward architecture and construction. He notes that these early buildings have important components of vernacular architecture, like thatched roofs, timber beams, and mud-brick walls. These components set the foundation for the region's architectural development by being tailored to the climate and available resources. The book describes how, as a result of regional building customs, early temples were frequently constructed on elevated platforms to protect them from water. Sarangi also talks on how community areas are included into temple complexes, which reflects the social and communal roles of traditional architecture. These ancient temples functioned as hubs for cultural events and social meetings in addition to being places of prayer.

Odisha's temple architecture developed over time, absorbing new features and styles while retaining many aspects of indigenous design. Sarangi charts this growth through many stages, showcasing important temples that represent important breakthroughs. The book examines how vernacular features were modified and evolved from straightforward, hut-like constructions to more intricate, gigantic temples. The three main forms of temple constructions found in Odisha are the Rekha

Deula, Pidha Deula, and Khakhara Deula. Sarangi explains the architectural characteristics and symbolic implications of these forms in detail. Both the Pidha Deula and the Rekha Deula, with their pyramidal roofs and curved towers, originated from earlier vernacular forms. The barrel-shaped roof of the Khakhara Deula is reminiscent of traditional hamlet cottages.

Sarangi explores the creative and iconographic elements of Odishan temples, demonstrating how the representation of mythical themes and deities was impacted by local customs. He looks at how local symbols and themes, such the naga (serpent), lion, and lotus, are incorporated into temple decorations and carvings. These elements, which have their origins in regional customs and folklore, were skillfully incorporated into the temple's design to increase its cultural resonance. The contribution of regional artists and craftspeople to the evolution of temple art is also covered in the book. Sarangi demonstrates the ways in which these craftspeople fashioned the unique aesthetic of Odishan temple sculpture while operating within the confines of local customs. Temples such as the Sun Temple in Konark and the Lingaraja Temple in Bhubaneswar are known for their elaborate carvings and exquisite iconography. Sarangi places emphasis on the religious and sociocultural milieu in which Odishan temples developed. He looks at how the locals' ideals and beliefs were reflected in the temples' roles as hubs of community life. The intimate interaction that existed between the temples and the populations they served is thought to be reflected in the integration of vernacular elements into temple architecture.

The article explores the function of temples in Odisha's religious life, emphasizing the ways in which local customs shaped the rites and ceremonies connected to temple worship. Sarangi talks on the yearly celebrations, processions, and other religious gatherings that happened in and around the temples, showing how these events had their origins in regional traditions. Sarangi discusses the difficulties in maintaining Odisha's architectural legacy in the last chapters. He talks on how modernity and urbanization have affected temple architecture and vernacular customs, arguing in favor of a preservation strategy that strikes a balance between the buildings' historical

significance and their continued relevance today. The book emphasizes the value of local communities in protecting their architectural legacy as well as effective conservation initiatives. In addition to its historical and cultural significance, Sarangi highlights the significance of preserving vernacular traditions because they have the ability to influence modern sustainable architectural techniques.

***Inference drawn:** This article delves deeply into the intricate relationship between the state's vernacular traditions and temple architecture. Sarangi shows how the development of temple forms in Odisha and vernacular architecture are closely related through in-depth examinations of architectural forms, iconography, and sociocultural contexts. The book focuses on architectural evolution but draws strong inferences regarding urbanization, particularly how traditional systems were formalized and how modern urbanization now threatens this legacy.*

Praharaj & Mallia (2004), attempt to highlight the art and crafts of Odisha depicting its glorious past and how art provides a clear picture of their daily lives.

Over the past 2500 years, Odisha has continuously been active in the field of art, crafts and sculpture. This can easily be witnessed in the historic temples which depict the temple architecture.

Blessed with natural beauty and rich mineral resources, this state has significant history of culture and heritage. As such, it has recorded history of music, dance and other art forms which are emanated in the temple art, rock cut sculptures, ancient caves etc.

The western districts of Sundargarh, Kalahandi and Jharsuguda have evidences of rock paintings dating to the palaeolithic age. The well-defined art and architecture of Odisha evolved from the Maurya, Meghavana and Gupta tradition, mentioned in the temples developed over the ages. The Odishan art also embraced other religion, clearly seen in the rock cut caves of Khandagiri. Buddhist and Jain mythologies were painted on the rocks, sculpted and had enough prominence in the region.

Similarly, the performing arts too flourished in the state since historic times. Some of the prominent dance forms are Chhaw, Sambalpuri, Chaitighoda, Ghumra, Danda nata, Ranapa, Paika and Chadheya. Tribal dances - Gadaba, Kandh, Koya Paraja and Desia nata are also influential.

As it seems from the research the inhabitants of Odisha possessed rich art form and culture which can only be possible with an established settlement transforming into an urban centre.

***Inference drawn:** The article describes a rich, continuous tradition of art, crafts, and sculpture in Odisha over 2500 years, inferring a direct link between this cultural activity and the presence of established settlements transforming into urban centers.*

2.2.3. Impact of urbanisation on the Temple Towns.

Mishra, Santosh (1989) in the INTACH report on Ekamra Kshetra Heritage Project provides an in-depth analysis of the then condition of the historic area of Bhubaneswar and possibly is one of the earliest to provide modern practical solutions for holistic development of the area.

It emphasizes that the dated history of Bhubaneswar emerges with the Kalinga war fought with the Ashok, somewhere in 3rd Century B.C. However, various archaeological excavations around the city suggest the existence of settlements since 2000 B.C. Bhubaneswar history still gets into dark until the 6th century A.D. This century marks the dawn of the glorious Odisha culture which transformed through phases, culminating in the 16th century, when Utkal lost its independence to the Sultans of Bengal.

Bhubaneswar was also known as Ekamra Kshetra and was the primary settlement in the region. It gained popularity as an important centre of Shaivism and developed into a city of temples, which is still now recognized as a significant pilgrim centre. The Ekamra Purana describes this place as a circular area, located by the side of river Gandhavati, currently known as Gangua, above the Swarnakuta hill.

The Ashokan stone edicts substantiate that ancient Bhubaneswar as a centre of Jainism until 3rd Century B.C., thereafter Buddhism became popular. 6th century onwards,

Hinduism gained prominence and Ekamra Kshetra became an important centre of pilgrimage.

On contrary to Puri, where the governance of the temples vested with the kings, Bhubaneswar never seems to have this kind of arrangement. Thus, on lines of Puri, a trust has to be developed for controlling the daily affairs of the temples in the Ekamra Kshetra.

Bhubaneswar is often termed as the 'City of Temples'. The major attraction are Lingaraj Temple, Dhauli and Udaygiri – Khandagiri hills.

Odisha was under Bengal province during the British rule, further divided and became a part of Bihar in 1912 under the British. It was only in 1936, following several years of agitation, the state of Odisha was born based on linguistic similarities. Cuttack was still the capital then.

It was in 1948, when it was unanimously decided that a new capital would be built in Bhubaneswar, due to land scarcity in Cuttack. New Bhubaneswar was developed to mark India's independence and provide better life to its residents.

No plan was initially developed for the old town of Bhubaneswar, despite the advise of the urban planner, Otto Koinsberger, to develop both the old and the new sites together, giving more importance to old Bhubaneswar. In 1956, Town Planning Act was developed but not implemented until years.

In Ekamra Kshetra, most of the temples are associated with tanks often located in the vicinity. Apart from being part of the temple complex, these often served the locality nearby for the purpose of bathing, drinking etc.

The Ekamra Kshetra consists of eight sacred precincts often termed as the 'Asta Ayatana'. These are mainly the eight clusters of temples and tanks which have been developed over periods. These Ayatanas do often resemble the development pattern of the urban centre called Bhubaneswar.

As a part of this study, INTACH undertook a survey of the monuments in the vicinity to find a total of 165 unprotected monuments which includes mostly temples, mathas,

tanks, old buildings, mandapas and even a fort. These were further classified into categories based on the need of attention.

Further, INTACH proposed for adequate development of the old city of Bhubaneswar towards a pilgrimage and tourist city. It proposed for development of appropriate tourist infrastructure that would boost tourism while maintaining the sanctity of the vicinity. It provided a long holistic survey and proposal report which included all minute details of infrastructure development such as storm water drainage, sewage, electrical supply, water supply and even illumination of monuments as well as streets. It also provided a list of native species which can be planted in the open areas and along the roads. It even covered the aspects of urban design – imageability including nodes and landmarks.

***Inference drawn:** This report provides a detailed understanding of the Ekamra Kshetra. Many of the shortcomings identified and proposed development still hold good in the recent urban settings.*

Praharaj (2012), sets base for a redevelopment of the areas around the Bindusagar lake in Bhubaneswar, Odisha.

Researcher has mentioned that the historic settlement of Bhubaneswar was based on the Asta- Ayatana or the eight sacred precincts concept. Each of these areas of the Asta – Ayatana were strategically placed based on the ritualistic and symbolic interdependence with the Lingaraj Temple being at the cynosure of all affairs. these temples have survived the initial fury of the Bengal Sultanate rulers owing to remoteness of the area from the centre of power. However, some temples faced the ire during the late 17th century from the rulers of Bengal.

Apart from just the temples, there were also the existence of tanks and ponds all of which were related to the temples and formed an important part of the urban affairs in the vicinity.

The continued presence of significant temple complexes in Bhubaneswar, such as the Mukteswar group (950-975 A.D.), Rajarani (950-975 A.D.), Lingaraja temple (11th

century A.D.), and Kedareshwar group of temples (12th century A.D.), highlights the enduring cultural legacy of this ancient temple city.

Associated Water Bodies

Numerous ponds and water tanks are closely associated with Bhubaneswar's many temples, including Bindusagar Lake, Papanasini Tank, Ganga Yamuna Tank, Gouri Tank, Bramha Tank, and Ramkunda (Tank). Among these, Bindusagar Lake, located north of the famous Lingaraja Temple, is approximately 1300 feet long and 700 feet wide. Historically, this large lake dates back to the 8th or 9th century A.D.

A new capital city of Bhubaneswar was proposed in the late 1940s, the 2nd planned city of the country, post-independence, after Chandigarh. The new capital town was planned to be laid on the southwest of the existing temple city. And thus, begun the transformation of Bhubaneswar from the city of temples to an important political modern town to be at the helm of affairs for the state of Odisha.

Careful planning was undertaken initially in a manner that the modern town doesn't amalgamate with the historic portions of the city. However, with the passage of time, eventually, the modern buildings slowly engulfed the old portions of the city.

The Old Town Area is plagued by congested roads, bustling marketplaces, and contaminated water bodies. It also suffers from insufficient stormwater drainage and an abundance of overgrown bushes and solid waste around its historical buildings. Many shrines and temples are often obscured by poorly constructed high-rise apartments, which have been erected over the years with little to no consideration for the Archaeological Survey of India (ASI) Act. The 25 sq km of the old town region has now become an amalgamation of historic temples with modern high-rise buildings leading to a confused skyline and character of the area, diluting the very original nature of the historic Bhubaneswar.

Inference drawn: Bhubaneswar, with the formation of the new Capital of Odisha was the 2nd planned city of independent India. Initially, care was taken to keep the two settlements apart. However, eventually, the rapid and unscrupulous growth of the city engulfed the old part of the city. What we have now is an obfuscated skyline in the old town.

Rajakumari, et. al (2019), Attempts to provide an urban design solution for development of historic towns of Tamil Nadu

The book by M. Rajakumari, R. Kalaiselvi, K. G. Preethi, and S. R. Tharun Balaji offers a thorough analysis of the spatial organization and urban design principles of Tamil Nadu's temple towns. The authors contextualize these settlements by summarizing Tamil Nadu's rich historical background and its Dravidian architectural style, highlighting how dynasties like the Pallavas, Cholas, Pandyas, and Vijayanagara encouraged temple construction, resulting in the development of these communities. The book establishes that temples are not merely religious sites but central hubs for social, cultural, and economic life, driving the growth and functional elements of these towns and illustrating the complex interactions between the sacred structure and its surrounding urban setting.

The core of the analysis focuses on the planning fundamentals, which are rooted in the ancient Indian scriptures of Vastu Shastra and Silpa Shastra. These texts dictate the principles for harmonious, directionally aligned, and well-ventilated spatial arrangements, creating urban areas that symbolize cosmic and spiritual order. The spatial organization of these towns is hierarchical and concentric, with the temple complex—including its *Gopuram* (gateway tower), *Mandapa* (pillared hall), *Vimana* (tower), and *Garbhagriha* (sanctum sanctorum)—at the absolute core, intentionally placed to evoke awe and reverence, and encircled by residential and commercial zones.

The book reinforces its arguments through comprehensive case studies of notable temple towns such as Madurai, Thanjavur, Kanchipuram, and Srirangam, detailing their specific layouts (e.g., Madurai's concentric streets and Thanjavur's grid-like design) and architectural features. Beyond planning, the authors examine the towns' functional characteristics, discussing how temples acted as significant economic institutions and fostered trade, education, and social organization, including spatial divisions based on caste and occupation. Finally, the work addresses the urgent need for conservation strategies to protect this architectural legacy from urbanization and neglect, emphasizing the value of governmental and community involvement in preserving these cultural assets.

Inference drawn: In addition to providing an in-depth analysis of the spatial organization and urban planning concepts of temple towns, this journal highlights the larger cultural and historical context.

Gupta (2024), has developed a proposal for development of Heritage Development Plan for the city of Varanasi.

Varanasi, a city with a rich history dating back to 1200 BCE, is facing threats to its architecture, traditions, and arts due to uncontrolled development, insufficient policies, and lack of awareness.

To safeguard this cultural heritage, a Heritage Development Plan (HDP) has been proposed. The HDP aims to identify and protect heritage resources, create conservation mechanisms, and integrate preservation into urban renewal. This plan adopts a holistic strategy focusing on the city's significance, multidisciplinary involvement, public participation, and a robust legal framework.

The Key Components of HDP include:

- Identification and documentation of heritage resources.
- Creation of heritage zones with specific regulations.
- Pilot projects for conservation, restoration, and reuse of heritage buildings.
- Development of operational and administrative frameworks.

Five pilot projects were identified to demonstrate the benefits of heritage conservation:

- Rejuvenation of Dasashwamedh Cultural Quarter
- Development of Panchkroshi Yatra Marg and Halts
- Restoration and development of three kunds
- Cultural center at Chet Singh Ghat Palace
- Conservation and restoration of heritage buildings

The Heritage Development Plan (HDP) is a comprehensive and holistic strategy designed to safeguard Varanasi's invaluable heritage and secure its legacy. It

emphasizes significance-driven conservation by balancing heritage preservation with urban development and the needs of residents. The ultimate goal of the HDP is to create a sustainable future for Varanasi, maintain its cultural identity, and position it as a World Heritage City.

***Inference drawn:** Like Varanasi, Bhubaneswar is also a centuries old city with many living tradition still practiced. On similar lines, it is imperative to have a Heritage Development Plan for Bhubaneswar.*

Sethupathi, Packiam (2020), have highlighted on several sustainable development approaches that can be applied in the conservation of the natural and built heritage of Madurai.

Madurai is a historical and cultural city in Southern India, famous for its contributions to **Tamil literature**, ecological traditions, and architectural marvels. Dating back to the pre-Christian **Sangam era** as the capital of the Pandian empire, its rich heritage forms the city's living fabric.

To ensure the city's legacy endures, both the government and local communities are promoting **resource conservation** and **sustainable urban development**. The goal is to achieve **sustainable tourism**, which balances economic growth with environmental protection and cultural preservation. The Tamil Nadu government is facilitating this by upgrading infrastructure and identifying sites for restoration.

Designated as a **heritage city** under the JNNURM scheme, Madurai's historical assets are concentrated along its four concentric streets, the Vaigai River, water bodies, natural mountains, and festival routes. Effective **heritage development plans** require a **comprehensive, multidisciplinary approach** that integrates preservation with development goals, ensuring sustainable growth while protecting these cultural assets within the Local Planning Authority (LPA) boundaries.

***Inference drawn:** The old city of Bhubaneswar can also be developed on the guidelines prepared for the Madurai City Development Plan. Both cities being as old, models can be case studied and implemented.*

Sharma, Mistry, Prajapati (2019), proposed an approachable revitalization plan for the historic city of Ahmedabad which has recently been inducted in the UNESCO World Heritage City list.

The historic cores of dense Indian urban settlements, designed to foster community, are exemplified by Ahmedabad's Bhadra Fort precinct (founded 1411). However, increasing commercial activity and urban development caused severe challenges, including traffic congestion, inadequate parking, encroachment by informal activities, pollution, and loss of visual character.

To address this, a revitalization project, funded under JnNURM, was successfully implemented in the Bhadra precinct of the now UNESCO World Heritage City. The comprehensive strategy focused on:

- Pedestrianization: Transforming the area between Bhadra Fort and Teen Darwaza into a pedestrian-friendly zone.
- Restoration: Conserving heritage structures like Bhadra Fort and Azam Khan Sarai and adapting them for new uses (e.g., tourist center).
- Urban Design: Establishing guidelines for harmonious development and rerouting traffic.

The project aimed to revitalize the precinct as a public space, reduce encroachments, and promote sustainable urban development while preserving its historical heritage. Ahmedabad's UNESCO designation bolstered support for these ongoing preservation efforts.

***Inference drawn:** The old town of Bhubaneswar has every potential to be listed as UNESCO World Heritage City. The successful bye-laws and proposals implemented in Ahmedabad can consistently serve as a valuable reference and model for similar heritage development initiatives in Bhubaneswar.*

Rai, Mahn (2020) present an analysis of the challenges in preserving the heritage of Amritsar

Amritsar, a Sikh holy city dating back to the 16th century, is renowned for 20th-century events like the Jallianwala Bagh massacre and Operation Blue Star. Recent initiatives, including the conservation of Gobindgarh Fort, the establishment of the

Partition Museum, and participation in the HRIDAY scheme, aim to diversify and enhance its heritage presentation, bringing "forgotten" histories into the mainstream narrative.

Despite having a rich and diverse past, the city faces challenges in heritage preservation due to religious violence, urban development, and sometimes simplistic government projects like the Heritage Street. A key initiative, the Rambagh Gate conservation project, aimed for a comprehensive, community-centered approach involving cultural mapping and adaptive reuse. However, it faced setbacks due to a lack of a shared vision, a formal conservation management plan, and interventions that compromised the site's integrity.

The overall challenge highlights the urgent need for a more inclusive and participatory approach to heritage management in India. The article concludes by emphasizing the necessity of creative dialogue among diverse stakeholders to conserve sites like the Rambagh Garden, reintegrate them into the city's fabric, and avoid a narrow focus on only aesthetics or economic interests. By incorporating local perspectives, Amritsar can ultimately develop a more meaningful and inclusive heritage narrative, reconnecting sites like the Rambagh Garden to the broader context of the Golden Temple .

***Inference drawn:** As highlighted in the article, Bhubaneswar too has a variety of stakeholders who need to be taken into account while undertaking major rejuvenation works.*

Chandan, Pipralia, Kumar (2023), focus on the challenges of urban conservation in the historic city of Puri

Puri, a vital pilgrimage site and cultural capital of Odisha, faces significant challenges due to its vulnerability to natural disasters and the need for urban heritage conservation. Despite its cultural significance, the city's heritage is often overlooked and at risk of damage.

The article highlights that historic cities globally struggle to balance modern development with heritage preservation, effectively manage infrastructure services to

handle tourism, and integrate diverse cultural traditions. Examples from Varanasi Ghats and Ahmedabad illustrate the need for conservation efforts that prioritize the relationship between daily life and monumental architecture, and the negative impacts of unregulated change.

To address Puri's multifaceted challenges (including infrastructure development and disaster management), the paper concludes that a modified and comprehensive planning approach is necessary. Key recommended strategies include:

- Developing a comprehensive heritage conservation plan with community participation.
- Investing in infrastructure development (transportation, sanitation, waste management).
- Implementing disaster risk reduction measures (early warning systems, preparedness plans).
- Promoting sustainable tourism and strengthening community engagement and partnerships.

By adopting these strategies, Puri can overcome its challenges, achieve its full potential, and secure its status as a world-class heritage city.

***Inference drawn:** Recommendations of a comprehensive approach, including urban conservation, infrastructure development, disaster management, sustainable tourism, community engagement, partnerships, and research can also be implemented in Bhubaneswar.*

Omar, Ramlee, Yunus, Samadi (2018), highlight the policies that have been helpful in the conservation of George Town, Penang, Malaysia.

The article, "Strategies for Urban Conservation: A case example of George Town, Penang", examines the factors that contributed to the preservation of George Town's urban heritage, which includes the largest collection of heritage shophouses in Southeast Asia, over 200 years of urban history.

The authors investigated the common assumption that the Control of Rent Act, 1966, was the primary instrument of protection. Their analysis of property transactions, rent-control records, and development applications found no conclusive evidence to support this claim. While rent control discouraged redevelopment, it also led to the neglect and deterioration of buildings due to low rental returns.

The study concludes that George Town's urban heritage was saved primarily by the unintentional effects of various development policies. Key factors included:

- "Decantation" Policy: A deliberate policy by the State Government to shift population growth and development interest away from George Town to the suburbs and Mainland, relieving the inner city of redevelopment pressure.
- Planning Uncertainty: Uncertainty in conservation policies and planning approvals (e.g., in the Interim Zoning Plan 1973) led to prolonged delays in granting development permissions, stalling the destruction of heritage properties.

Despite over 30 years of deliberate conservation efforts and policy statements, the policies themselves were not found to have had the desired protective effect. The paper emphasizes that the future success of conservation in George Town, especially following the repeal of rent control, cannot rely solely on cultural nostalgia but must address economic realities.

Inference drawn: As per the report, only physical policies do not augment in conservation of a given place. There is a need to develop policies that shift population and development policies away from the historic places. There is an imminent need of similar policies for the holistic development of Ekamra Kshetra Area, Bhubaneswar.

Conclusive Inference from Case Studies:

Comparative analysis of heritage cities globally highlights shared challenges, including encroachment, commercialization, and non-inclusive governance. However, successful international strategies offer key lessons for India's heritage development, exemplified by:

- *Community Participation (Amritsar): Essential for robust heritage management.*

- *Pedestrianization (Ahmedabad): Effective for revitalizing public spaces and mitigating traffic congestion.*
- *Adaptive Reuse (Madurai): Provides long-term purpose for historic structures, stimulating revitalization.*
- *Strategic Development Shift (George Town, Penang): The preservation of George Town was largely accidental, enabled by the "decantation" policy that deliberately shifted development away from the historic core, relieving pressure from the "wrecking ball".*

Collectively, these successful strategies and the demonstrated need for strategic decentralization of development inform the prospective Ekamra Kshetra Heritage Development Plan.

2.3. Comparative

The articles have been selected based on their relevance to the subject of urban design, conservation and policies that would be helpful in the development of an adequate framework for the greater study, holistic and sustainable improvement of Ekamra Kshetra.

An analysis of the selected earlier works is presented in Table 2.1 following the thorough study of the articles. This will be helpful in defining parameters for further scrutiny of the site selected for studies.

Table 2.1: Analysis of earlier works			
Sl. No.	Author, Year	Name of the paper/ article/ report/book/ manuscript	Outcome/Remarks
1	Kak, 2005	Early Indian Architecture	Synthesizes Coomaraswamy and Renou's scholarly insights on Indian art and architecture, rooted in historical context and informed by prehistoric artistic expressions.

2	Das, 2019	History Of Odisha (From earliest times to 1434 A.D.)	Odisha's ancient tapestry unfolds through historic documents, revealing a network of towns that have witnessed the passage of time.
3	Patra and Patra, 2004	Archaeology and the Maritime History of Ancient Odisha	Archaeological digs in Odisha unveil a tapestry of ancient settlements, from prehistoric beginnings to bustling trade hubs, revealing the state's pivotal role in India's maritime network with global connections.
4	Mishra, 2011	Social Formations In Early Historic Orissa	Odisha's prehistoric social fabric, woven from hunting-gathering to early agriculture, laid the foundation for urban centers, nurtured by resource-rich geography and evolving socio-economic complexities.
5	Mishra, Brundabana, 2012	Social Structure of Western Odisha under the Chauhans of Sambalpur	Western Odisha during the 16th-18th centuries was characterized by a complex social structure dominated by feudal lords, with diverse tribal communities coexisting, often marginalized, amidst agrarian and artisanal castes.
6	Sterling, 1904	Account of Orissa	Odisha's ancient chronicles, epigraphs, and archaeological excavations offer the earliest glimpses into the state's rich historical tapestry.
7	Fergusson, 1910	History Of Indian and Eastern Architecture	Bhubaneswar, Cuttack, Puri, and Ganjam district, once adorned with resplendent temples and monuments, witnessed a gradual decline of their historic structures by the middle of the 19th century, succumbing to neglect, natural calamities, and colonial indifference.
8	Garnayak, 2007	Evolution of Temple Architecture in Odisha	Odisha's temples: From modest beginnings to soaring spires, a thousand-year dance of stone and spirit.

9	Mishra, 2005	Evolution of Temple Architecture in Odisha	From modest shrines to ornate edifices, temples evolved from simple structures to complex architectural marvels, reflecting societal, religious, and artistic advancements over nine centuries.
10	Chand, 2005	Orissan Temple Architecture	Rekha deula: Curving spire, Pidha deula: Stepped pyramid, Khakhara deula: Elongated barrel roof.
11	Mohanty, 2003	Regional Identity of Odisha: Contribution of studies on temples	Odisha: A living chronicle etched in stone, where temples rise in chronological splendor, from the modest Parasurameswara to the majestic Lingaraja.
12	Sarangi, 2017	Influence of Vernacular Architecture in Evolution of Temple forms of Odisha	Odisha's rural temples, simple yet divine, typically feature a sanctum (deul), an assembly hall (jagamohan), and often a dance hall (natamandir), showcasing rich carvings and local craftsmanship.
13	Praharaj & Mallia, 2004	Art-Heritage of Odisha	Odisha's art and crafts are vibrant chronicles, painting a vivid tapestry of its regal past and the everyday lives of its people.
14	Mishra, 1989	INTACH Report on Ekamra Kshetra Heritage Project	Bhubaneswar's historic core, grappling with rapid urbanization and neglect, necessitates a comprehensive revival plan encompassing heritage conservation, sustainable infrastructure, community engagement, and tourism promotion for holistic development.
15	Praharaj, 2012	Historic Conservation and Sustainability: Case of Bindusagar lake, Old Bhubaneswar	Revitalize Bindusagar as a cultural and ecological hub by restoring the lake, developing green spaces, promoting water sports, and creating heritage-themed commercial zones, all while preserving its historical significance.
16	Rajakumari, et. Al, 2019	Urban Design & Spatial layout of Temple & Temple	Harmonize heritage with modernity: Revitalize Tamil Nadu's historic towns through sensitive urban design, preserving

		Towns of Tamilnadu-India	cultural identity while fostering sustainable growth.
17	Gupta, 2024	Heritage Development Plan for the Historic city of Varanasi	Bhubaneswar, like Varanasi, is a city with a profound historical legacy and vibrant cultural practices. To safeguard this invaluable heritage, a dedicated Heritage Development Plan is indispensable.
18	Sethupathi, Packiam, 2020	Conservation Of Natural And Hertiage Resources In Madurai Region, Tamilnadu, India	Given the historical similarities between Bhubaneswar and Madurai, the development guidelines established for Madurai could serve as a valuable model for revitalizing Bhubaneswar's old city.
19	Sharma, Mistry, Prajapati, 2019	Revitalization Strategy for Historic Core of Ahmedabad	The urban planning and heritage conservation strategies successfully implemented in Ahmedabad could serve as valuable models for Bhubaneswar's own development.
20	Rai, Mahn, 2020	Challenges in preserving Amritsar's diverse heritage	A collaborative approach that considers the needs and perspectives of all stakeholders is essential for successful heritage conservation and urban development.
21	Chandan, Pipralia, Kumar, 2023	The challenges of urban conservation in the historic city of Puri	Bhubaneswar, like Puri, could benefit from a comprehensive approach to urban conservation.
22	Omar, Ramlee, Yunus, Samadi, 2018	Urban Public Space Revitalisation Strategies	Urban development away from the Ekamra Kshetra will be necessary for a long term preservation of the space along with holistic development.

The review of literature and case studies indicates that successful heritage management in Indian temple towns relies on a combination of participatory governance, adaptive reuse, and integrated planning principles - which shall guide the revitalization of Bhubaneswar's historic core.

2.4. Conclusion:

Odisha's rich history is intricately woven through its ancient towns, as revealed by historical records. These urban centers stand as silent witnesses to the state's dynamic past. Archaeological explorations in Odisha have unearthed a rich chronicle of human habitation, spanning from prehistoric eras to thriving maritime centers. These discoveries underscore Odisha's indispensable position as a linchpin in India's maritime trade, fostering global exchanges and cultural interactions. Odisha's temples stand as enduring testaments to a thousand years of artistic and spiritual evolution, their forms ascending from humble origins to celestial heights, a magnificent choreography of stone and soul. It concisely highlights the transformation from humble beginnings to grand structures, linking this architectural development to broader societal, religious, and artistic progress. It effectively encapsulates Odisha's rich architectural heritage and the chronological progression of its temple architecture, from the early, simple style to the later, grand masterpieces.

Bhubaneswar, Cuttack, Puri, and Ganjam, once adorned with resplendent architectural marvels, suffered a tragic decline by the mid-19th century due to neglect, natural disasters, and colonial apathy. Bhubaneswar's historic core stands at a critical juncture, caught between the pressures of rapid urbanization and the perils of neglect. To ensure its sustainable future, a multifaceted revival plan is imperative. The plan must prioritize heritage conservation to safeguard the city's cultural identity, invest in sustainable infrastructure to enhance livability, foster community engagement for ownership and participation, and strategically promote tourism to drive economic growth. Only through a holistic approach can Bhubaneswar's historic core be revitalized, preserving its rich heritage while adapting to the demands of the 21st century.

The articles, journal and books shortlisted effectively capture the essence of Odisha's art and crafts as a rich repository of its history and culture. By meticulously blending traditional urban fabric with contemporary needs, we can create thriving communities that honor the past while embracing tomorrow.

Bhubaneswar is a city with a millennium-old history and enduring traditions. There is an urgent need for a Heritage Development Plan to protect and enhance its cultural heritage.

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3. Chronological Exploration: Evolution of Historic Towns in Odisha.

3.1. Introduction

The state of Odisha, formerly known as Orissa, is situated on India's eastern coast and is bordered to the east by the Bay of Bengal. Ancient temples, colorful festivals, traditional arts, and a wide variety of fauna may all be found there. It is renowned for its rich cultural legacy, history, and scenic beauty. One of the eight classical dance forms of India, Odissi, is renowned in the area. The terrain of Odisha is varied, encompassing vast forests, mountainous areas, and coastal plains (Das, 2019).

Odisha's traditional villages have been profoundly influenced by urbanization, which has brought with it both opportunities and challenges. Modern infrastructure is invading historic sites due to urban expansion. It has endangered the structural integrity and cultural relevance of historic urban areas. Land use changes, transportation congestion, and population growth all put strain on historic regions in cities like Puri, Cuttack, and Bhubaneswar. Traditional ways of life are frequently lost as a result of this progress, and intangible cultural heritage is eroded. If well managed, urbanization can also have positive effects for conservation efforts. This can help in better infrastructure and more economic opportunities (Mishra, 1989). To ensure that modernity does not come at the expense of cultural heritage, a balanced strategy integrating sustainable urban design and active community involvement is necessary for the effective preservation of Odisha's historic settlements.

3.2. Important Civic Centres in Odisha

The capital city, Bhubaneswar, is renowned for both its contemporary urban design and its ancient temples. It is a significant hub for information technology and education as well.

Cuttack is an old city that serves as Odisha's commercial hub. It is well-known for both the yearly Durga Puja celebration and its silver filigree artwork. The seaside city of Puri is well-known for the Jagannath Temple and the yearly Rath Yatra celebration. Because of its beaches, it is a well-liked travel destination as well. One of the biggest

steel plants in India, the Rourkela Steel Plant, is the main attraction of this industrial city. It is a significant center for technical and engineering education. Sambalpur, well-known for its rich cultural legacy, particularly for its folk dances and sarees. It is a major commercial and educational hub as well. Berhampur is a significant economic hub in the state's south, renowned for its temples, educational facilities, and silk sarees.

Balasore is known for its strategic significance because of the Integrated Test Range of the Indian Ballistic Missile Defense Program. It serves as a hub for the fisheries sector as well. Jharsuguda is a growing industrial centre with large power plants and coal deposits. Both the economy and the infrastructure are growing quickly. These civic hubs are essential to Odisha's social, cultural, and economic environment.

List of Historic Settlements in Odisha

The famous historic towns of Odisha were

- Viraja nagari – Jajpur.
- Ekamra prastha – Bhubaneswar.
- Sri Purushottam Puri – Puri
- Konakama – Konark
- Kosala – Sambalpur
- Kongoda – Ganjam
- Utkala - Cuttack

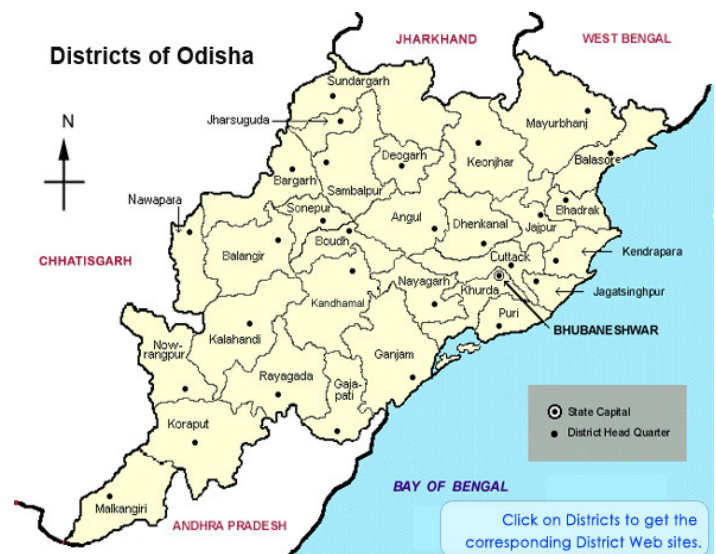


Figure 3.1 - Map to show the historic settlements in Odisha; Source- <https://diligentias.com/odisha-states-information-important-facts/>

3.3. City of Bhubaneswar

The state capital of Odisha, Bhubaneswar, has been an important center of religion and culture for more than two millennia. Known as the "City of Temples," Bhubaneswar was formerly a part of the Kalinga monarchy. Many temples dot the city's landscape, the most prominent of which is the 11th-century Lingaraja Temple, a masterwork of Kalinga architecture. The historical significance of the city as a hub for Hindu worship and innovative architecture is reflected in these temples (Seymour, 1980).

The legendary Kalinga War occurred in the region during Ashoka's rule in the third century BCE.

Following this event, Ashoka adopted Buddhism, which had a profound impact on the religious and cultural fabric of the area.

Known as the "Temple City of India," Bhubaneswar is a significant religious center that is well-known for its historic temples and rich cultural legacy. The city is home to more than 700 temples, the most well-known of which is the Lingaraj Temple, which honors Lord Shiva and features Kalinga architecture. Other important religious locations are the Rajarani Temple, the Mukteshwar Temple, and the Ananta Vasudeva Temple. The temples of Bhubaneswar draw both tourists and believers because they provide a spiritual and architectural window into the past. The city is a major hub for religious events and pilgrimages because of its unique combination of spirituality, history, and culture. As a religious hub, Bhubaneswar kept growing, drawing tourists and academics from various parts of India. When the city was selected in 1948 to serve as the capital of the newly created state of Odisha, it experienced a dramatic metamorphosis in the middle of the 20th century. The new capital was to be designed by German architect Otto Königsberger, who created a contemporary urban layout with wide streets, green areas, and administrative buildings. With this construction, Bhubaneswar officially changed from being a medieval temple town to an urban



Figure 3.2 - Map of Odisha marking Bhubaneswar; Source- https://www.researchgate.net/figure/Map-showing-location-of-Bhubaneswar-city-in-Odisha-eastern-India_fig1_328496862

planning hub (Mishra, 1989).

Bhubaneswar has seen a rapid increase in modernization and urbanization in recent years. With the presence of numerous esteemed establishments like the All-India Institute of Medical Sciences (AIIMS) and the Indian Institute of Technology (IIT), it has become a significant center for both education and the economy. The IT industry in the city has expanded, drawing capital and creating job possibilities. Bhubaneswar has made progress in the development of its infrastructure, including new commercial spaces, contemporary residential complexes, and better transportation networks, in tandem with its economic expansion.

Even with these developments, Bhubaneswar has been able to maintain its cultural legacy. The city's distinct fusion of heritage and advancement is highlighted by the presence of historic temples and contemporary facilities. Bhubaneswar is regarded as one of India's smart cities today, successfully juggling modern urban development with the preservation of its rich cultural history. The city is still thriving today (Jha, 2018).

3.3.1. Bhubaneswar – Historic Group Settlements

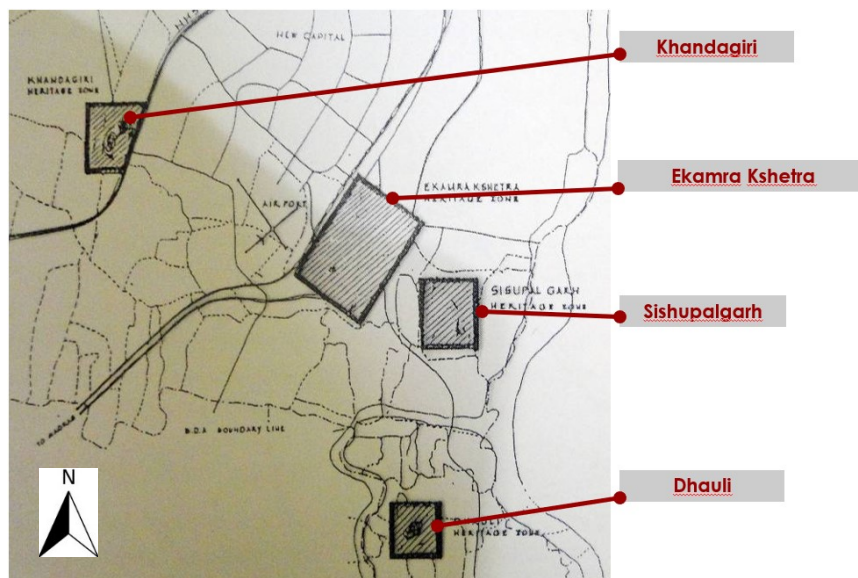


Figure 3.3 - Map showing the ancient group settlements in Bhubaneswar
Source:

https://www.researchgate.net/publication/325904510_The_Chitrakarini_Temple_of_Bhubaneswar_Odisha_India_An_Investigative_Field_Study

Acclaimed for its ancient group settlements, Bhubaneswar has a rich and varied cultural legacy in places like Dhauili, Khandagiri, Ekamra Kshetra, and Sishupalgarh. Every one of these locations provides a

distinct window into the rich past and magnificent architecture of Odisha.

Khandagiri: Noted for its rock-cut caves that date back to the first century BCE, Khandagiri is also known for the nearby Udayagiri hills. King Kharavela of the Mahameghavahana dynasty ordered the construction of these caverns for Jain monks. The stunning sculptures and inscriptions in the meticulously carved caves, like the well-known Rani Gumph (Queen's Cave), offer insights into the Jain religion and the sociopolitical context of the time. The area's rich spiritual and cultural history is attested to by the caverns.

Ekamra Kshetra: Known for its concentration of historic temples, Ekamra Kshetra, the old town of Bhubaneswar, has been dubbed the "City of Temples." The exquisite 11th-century Lingaraja Temple, devoted to Lord Shiva, is located in this region. The temple complex, with its soaring spire, elaborate carvings, and expansive courtyard, is a prime example of Kalinga architecture. Other noteworthy temples in Ekamra Kshetra include the Rajarani Temple, distinguished by its red and yellow sandstone structure, and the Mukteswara Temple, renowned for its elaborate carvings and elaborate archway. Because of its historical significance, this region is a hub for religious and cultural events, honoring the city's long history. (Mishra,1989)

Sisupalgarh: One of India's biggest and best-preserved ancient fortifications, Sisupalgarh is an old fortified city that dates back to the third century BCE. A sophisticated urban colony with thoughtfully designed streets, imposing entrances, and cutting-edge drainage systems is revealed by archaeological investigations. The city's rectangular layout and fortified walls were purposefully created to highlight the engineering prowess and urban planning abilities of its residents. Sisupalgarh provides an enlightening glimpse into Odisha's pre-urban history and its importance as a significant political and cultural hub.

Dhauili: Situated on the banks of the Daya River, Dhauili is a location with significant religious and historical significance. It is most known for being connected to the Kalinga War (261 BCE), which turned Emperor Ashoka from a conqueror to a Buddhist supporter. The Shanti Stupa (Peace Pagoda), built in the 1970s by the Japan Buddha Sangha and the Kalinga Nippon Buddha Sangha, is a distinguishing feature of the Dhauili hills. Reflecting Ashoka's adoption of Buddhism, the rock edicts of

Ashoka, written on a rock next to the stupa, promote the values of dharma (righteousness) and non-violence. Dhauli is still a popular destination for pilgrims and a representation of harmony and tranquility.

The city of Bhubaneswar is an essential storehouse of India's cultural and historical heritage because of its historic group settlements, which collectively tell a compelling story of the area's prehistoric past, religious development, and architectural mastery.

3.3.2. Bhubaneswar – Group Settlements through Ages

Bhubaneswar, a city renowned for its rich history and architectural wonders, has undergone several phases of development, each distinguished by unique group settlements that over the ages have reflected the cultural, religious, and political significance of the city. These communities' development can be linked to numerous significant historical periods:

Ancient Period (3rd Century BCE - 1st Century CE):

Sisupalgarh: Dating back to the third century BCE, Sisupalgarh is one of the oldest known urban settlements in Bhubaneswar. This fortified city, with its rectangular form, imposing entrances, and intricate drainage systems, is a prime example of superior urban design. During the Mahameghavahana dynasty's tenure, archaeological digs have shown a prosperous metropolis that functioned as a significant political and cultural center.

Early Historic Period (1st Century BCE - 3rd Century CE):

Khandagiri and Udayagiri caverns: In the first century BCE, King Kharavela ordered the construction of these rock-cut caverns for Jain monks. The elaborate carvings and inscriptions on the cave walls offer important insights into the religious and cultural customs of the era. The intricate sculptures and architectural aspects of the Rani Gumpha, also known as Queen's Cave, are especially noteworthy.

Medieval Period (7th Century CE - 12th Century CE)

Ekamra Kshetra: Bhubaneswar, and especially the Ekamra Kshetra region, became an important religious centre in the Middle Ages. Many temples were built during this time, the most well-known of which is the 11th-century Lingaraja Temple. The temple

complex is a prime example of the Kalinga architectural style, which is distinguished by tall spires, fine sculptures, and complex rites. Other noteworthy temples from this era are the Rajarani Temple, which is distinguished by its distinctive sandstone structure, and the Mukteswara Temple, which is well-known for its elaborate arches.

3.3.3. Ekamra Kshetra – Development of Astayatana

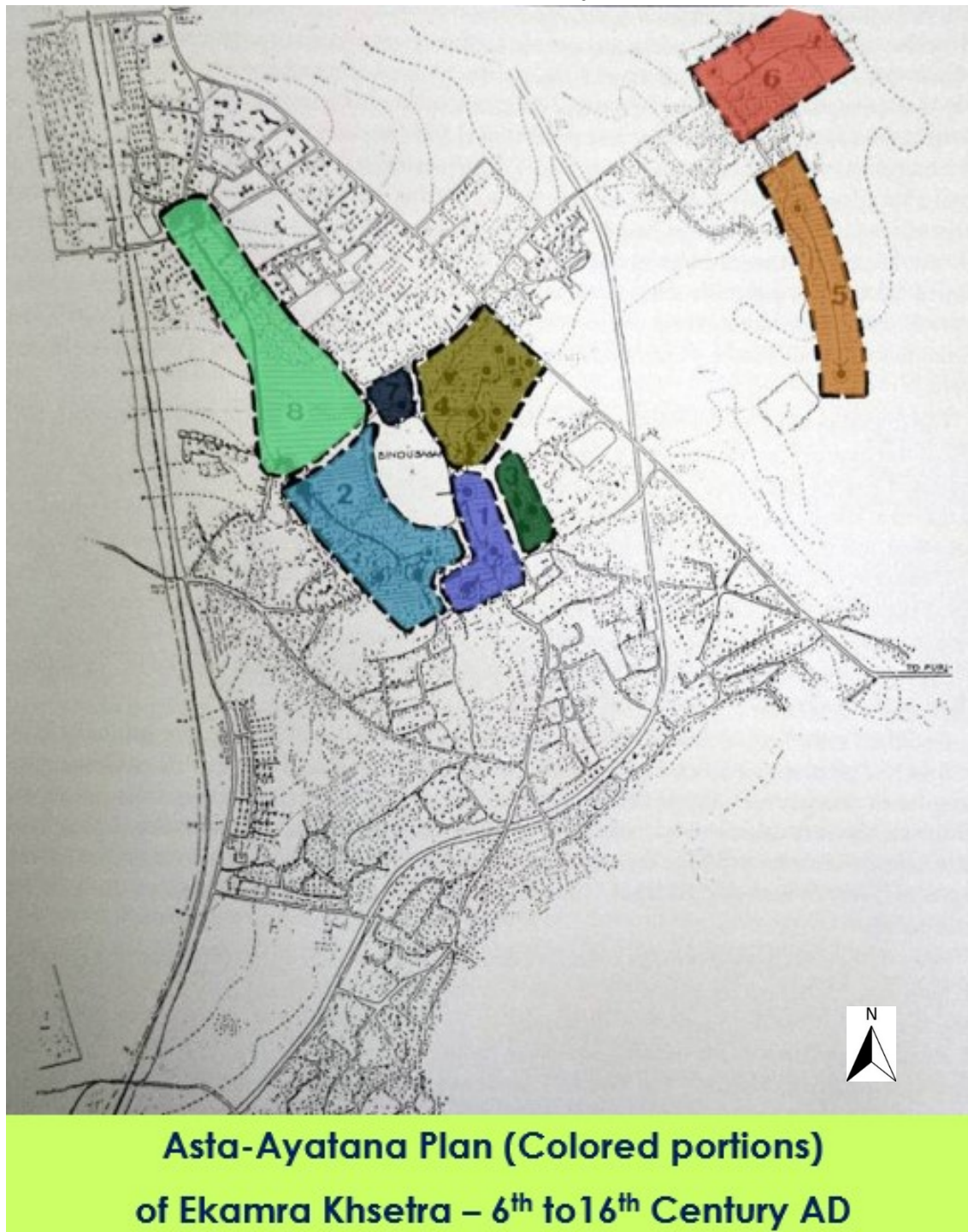


Figure 3.4 - Asta Ayatana Plan of Ekamra Kshetra

Source : INTACH Heritage Report, 1989

Table 3.1: Ayatanas and important monuments

Name of Ayatana	Important Monuments
1 st Ayatana	Ananta Vasudeva, Lingaraj, Sahasralinga Tank
2 nd Ayatana	Papanasini Kunda, Yameswara, Venu – Kichaka
3 rd Ayatana	Ganga Yamuna Kunda, Mukhteswara
4 th Ayatana	Rajarani, Kedareswara, Gouri Kunda
5 th Ayatana	Brahma Kunda, Brahmeswara
6 th Ayatana	Megheswara, Kapalamochaneswara
7 th Ayatana	Uttareshwara, Bhimeswara
8 th Ayatana	Rama Kunda, Lakshmaneswara

3.3.4. The Ekamra Kshetra Chronology

The history of the Ekamra Kshetra neighborhood of Bhubaneswar is extensive, spanning multiple centuries. This area, which is well-known for having a high concentration of temples, displays how Odisha's architecture and culture have changed throughout time. This is a summary of Ekamra Kshetra in chronological order:

Ancient Period (3rd Century BCE - 3rd Century CE)

- **Early Settlements:** A religious and cultural hub starts to emerge in the vicinity of Ekamra Kshetra. Little shrines and other buildings that served as the basis for later temple development were probably present in the early communities.
- **Early Historic Period:** from the third to the seventh centuries CE
First Temple Buildings: During this time, the groundwork for the massive temple complex that would eventually become Ekamra Kshetra is started. Early temple

design begins to take shape, influenced by local architectural traditions as well as religious beliefs.

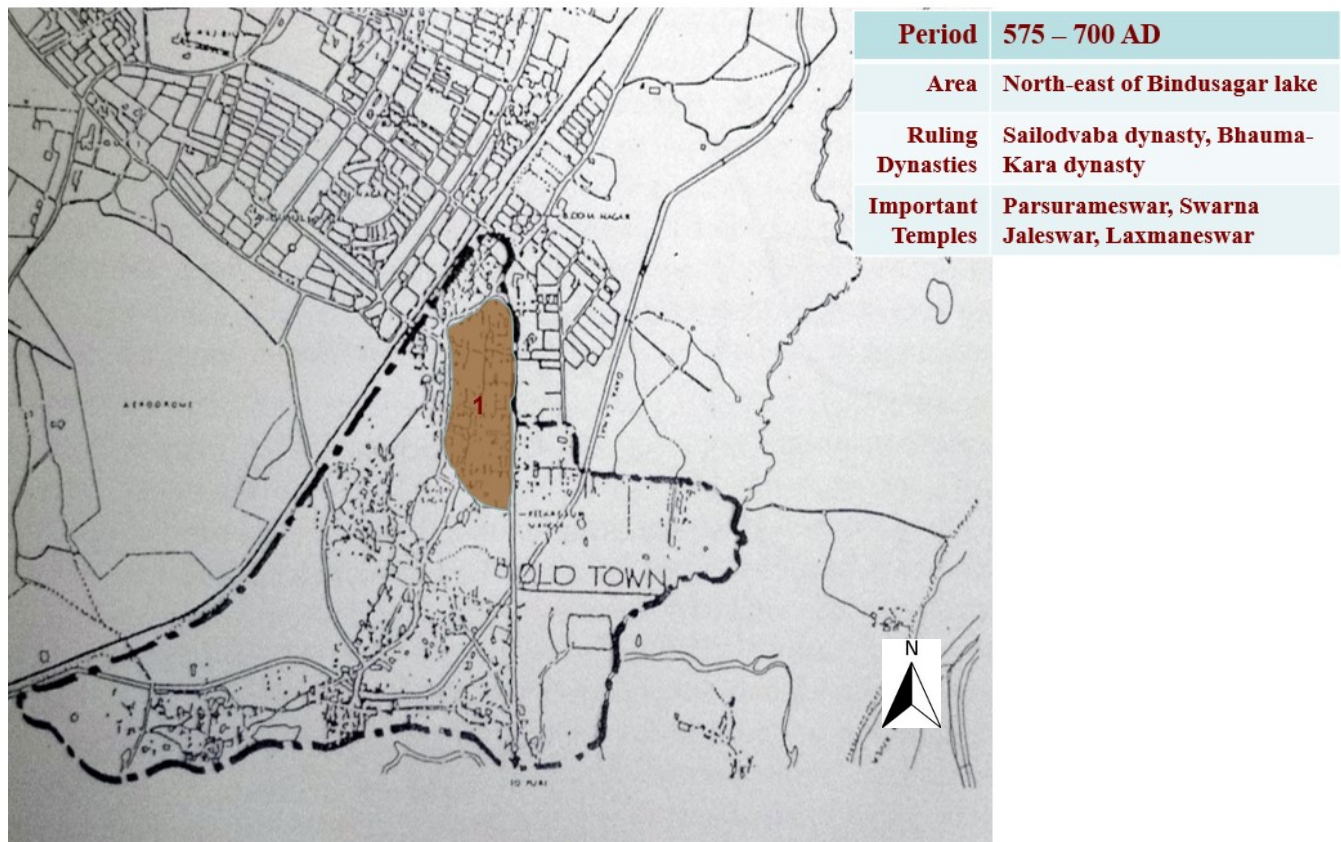


Figure 3.5 – Map showing Ekamra Chronology A; Source : Author

Early Historic Period (3rd Century CE - 7th Century CE)

- **Important Temple Constructions:** In the seventh and eighth centuries CE, the Mukteswara Temple, which is regarded as a masterpiece of Odishan architecture, is built. The development of the mature Kalinga architectural style can be seen in this temple, which features an outstanding torana (arched entryway) and intricate sculptures.

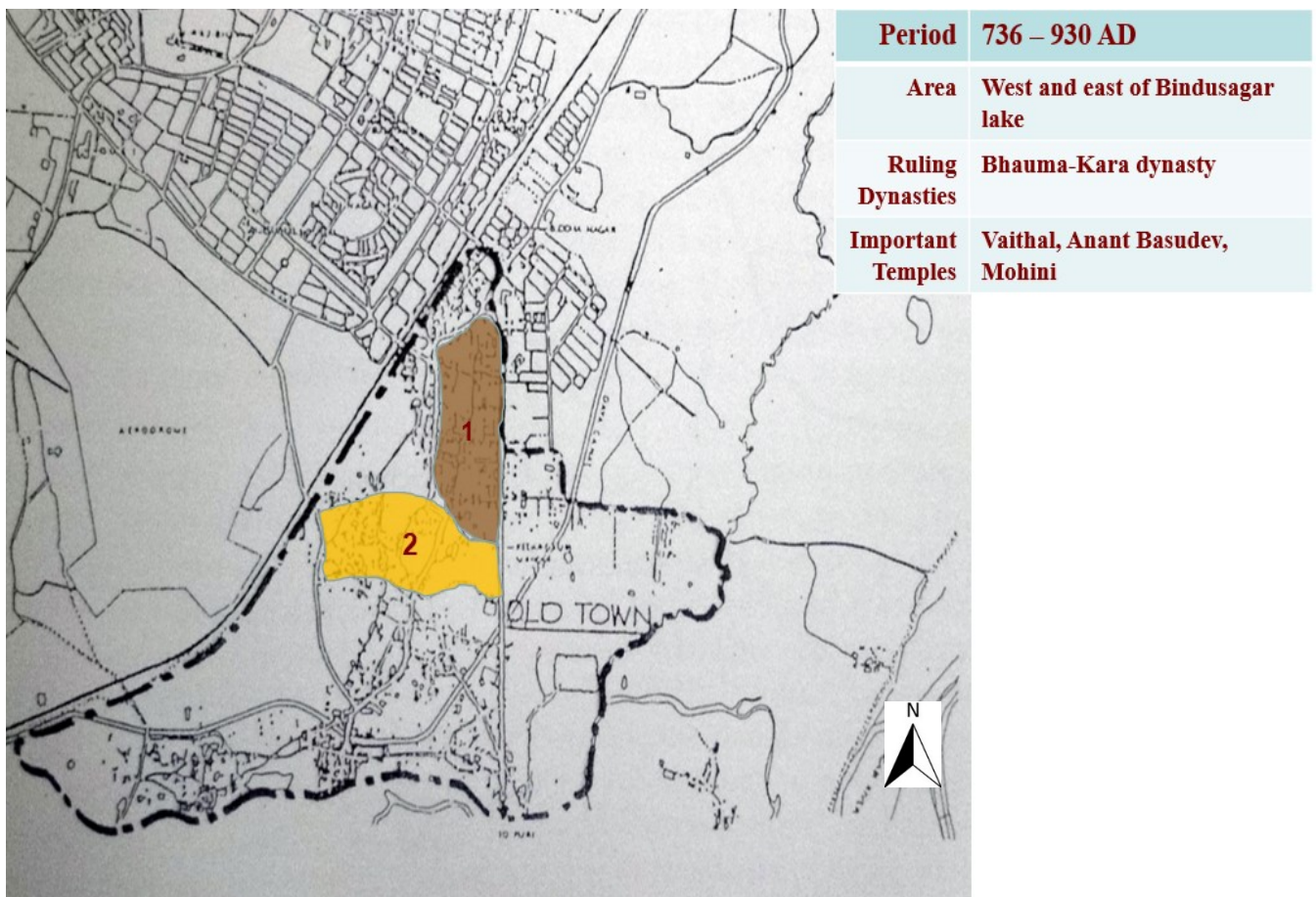


Figure 3.6 – Map showing Ekamra Chronology B; Source : Author

Medieval Period (7th Century CE - 12th Century CE)

- 9th–10th century CE: A number of minor temples are constructed, including the Parsurameswar Temple, which demonstrates the intricate details of temple building and sculpture as they evolve.

11th century CE: Work on the Lingaraja Temple begins. This is the biggest and most well-known temple in Ekamra Kshetra. This temple, which honors Lord Shiva, becomes a hub for devotion and pilgrimage and represents the pinnacle of Kalinga architecture.

- The Rajarani Temple is constructed in the twelfth century CE. It is distinct from the other temples in Bhubaneswar due to its intricate figurative carvings and unusual red and yellow sandstone.

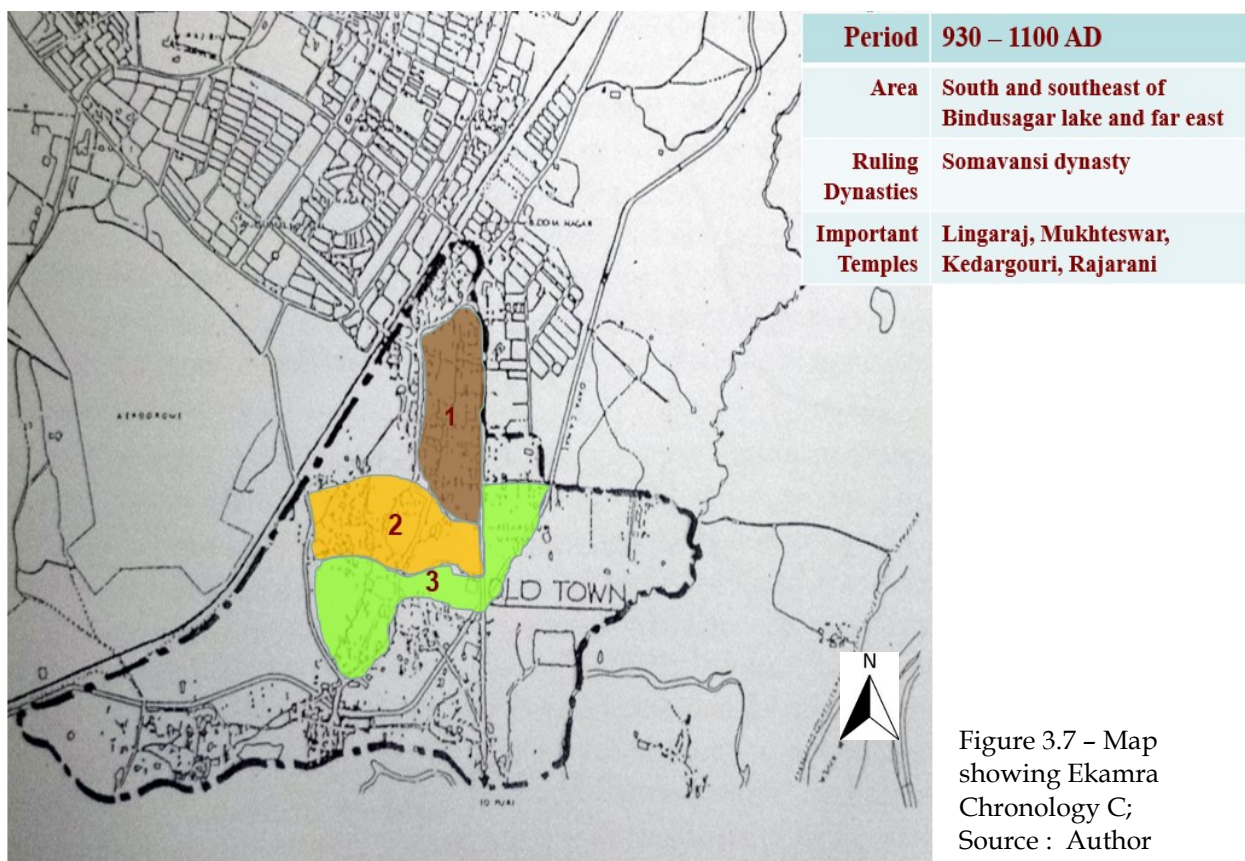


Figure 3.7 – Map showing Ekamra Chronology C;
Source : Author

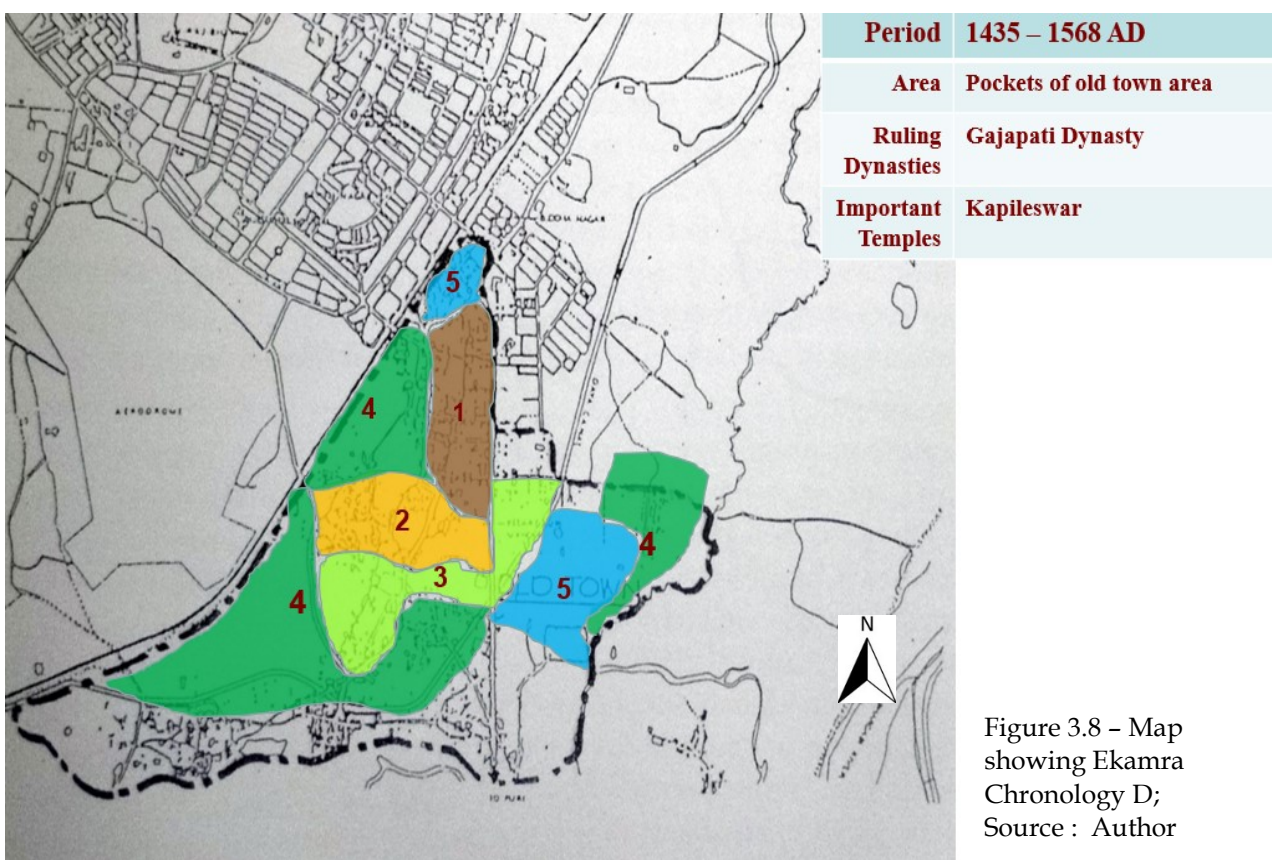


Figure 3.8 – Map showing Ekamra Chronology D;
Source : Author

Post-Medieval Period (13th Century CE - 18th Century CE)

- **Remaining Religious Significance:** Ekamra Kshetra is still very important religiously, even though the number of new temples being built is decreasing. The temples are still used as active places of worship, and the region is where older buildings are maintained and occasionally renovated.
- **Cultural Renaissance:** With rituals, festivals, and customs being actively kept and upheld, the temples of Ekamra Kshetra are essential to Odisha's cultural renaissance.

Colonial Period (19th Century CE - Mid-20th Century CE)

- **British Administration:** There is very little direct action in Bhubaneswar, including Ekamra Kshetra, during British control. Local communities still acknowledge and protect the area's religious and cultural legacy, nevertheless.
- **Archaeological Interest:** Historians and archaeologists are drawn to the temples, which prompts research and documentation that serves to conserve and advance knowledge of Odisha's architectural legacy.

Modern Period (Post-Independence 1947 - Present)

- **1948:** The newly constituted state of Odisha names Bhubaneswar as its capital. Planned urban development is implemented in the area, fusing contemporary infrastructure with its ancient landmarks.
Conservation Initiatives: With a greater emphasis on conserving Ekamra Kshetra's historical legacy, conservation initiatives are being undertaken to preserve the temples' structural integrity and cultural relevance.
- **Travel and Pilgrimage:** Ekamra Kshetra is becoming a popular travel and pilgrimage site. In order to maintain the viability of the historic temples and their customs in the face of contemporary development, the state government and local authorities market the region as a heritage site.
- **The Smart City effort,** which includes Bhubaneswar, includes goals to improve urban living while honoring and protecting its historical zones, such as Ekamra Kshetra.

3.3.5. Development of New Capital Town of Bhubaneswar

An important period in the history of Odisha and post-independence urban planning in India was marked by the growth of the new town of Bhubaneswar in the middle of the 20th century. The necessity to replace the older, more crowded town of Cuttack with a new capital for the state of Odisha was the driving force behind this transition.

Initial Strategy and Vision

1948: Following Indian independence, Odisha needed a new capital large enough to handle contemporary administrative tasks and allow for further expansion. The historical significance, strategic position, and potential for growth of Bhubaneswar led to its selection.

Otto Königsberger's Master Plan: The new town was designed by German urban planner and architect Otto Königsberger. His idea of a contemporary, well-functioning metropolis with an orderly urban structure was paramount. Wide streets, lots of greenery, and separate areas for business, residential, administrative, and recreational use were all included in the concept. The goal of Königsberger's design was to create an effective, well-structured urban environment by incorporating modern planning ideas.

The urban planner was clear in his thought. With due respect to the historic areas of Bhubaneswar, he planned the contemporary city with no interference into the old city.

Table 3.2 – Historic Settlement of Bhubaneswar through Ages

<u>Period</u>	<u>Area</u>	<u>Ruling Dynasty</u>	<u>Important Temples</u>
575 – 700 AD	North-east of Bindusagar lake	Sailodvaba dynasty, Bhauma-Kara dynasty	Parsurameswar, Swarna Jaleswar, Laxmaneswar
736 – 930 AD	West and east of Bindusagar lake	Bhauma-Kara dynasty	Vaithal, Anant Basudev, Mohini
930 – 1100 AD	South and southeast of Bindusagar lake and far east	Somavansi dynasty	Lingaraj, Mukhteswar, Kedargouri, Rajarani
1100 – 1435 AD	Far south of Bindusagar lake	Eastern Ganga dynasty	Chitrakarini, Megheswar
1435 – 1568 AD	Pockets of old town area	Gajapati Dynasty	Kapileswar

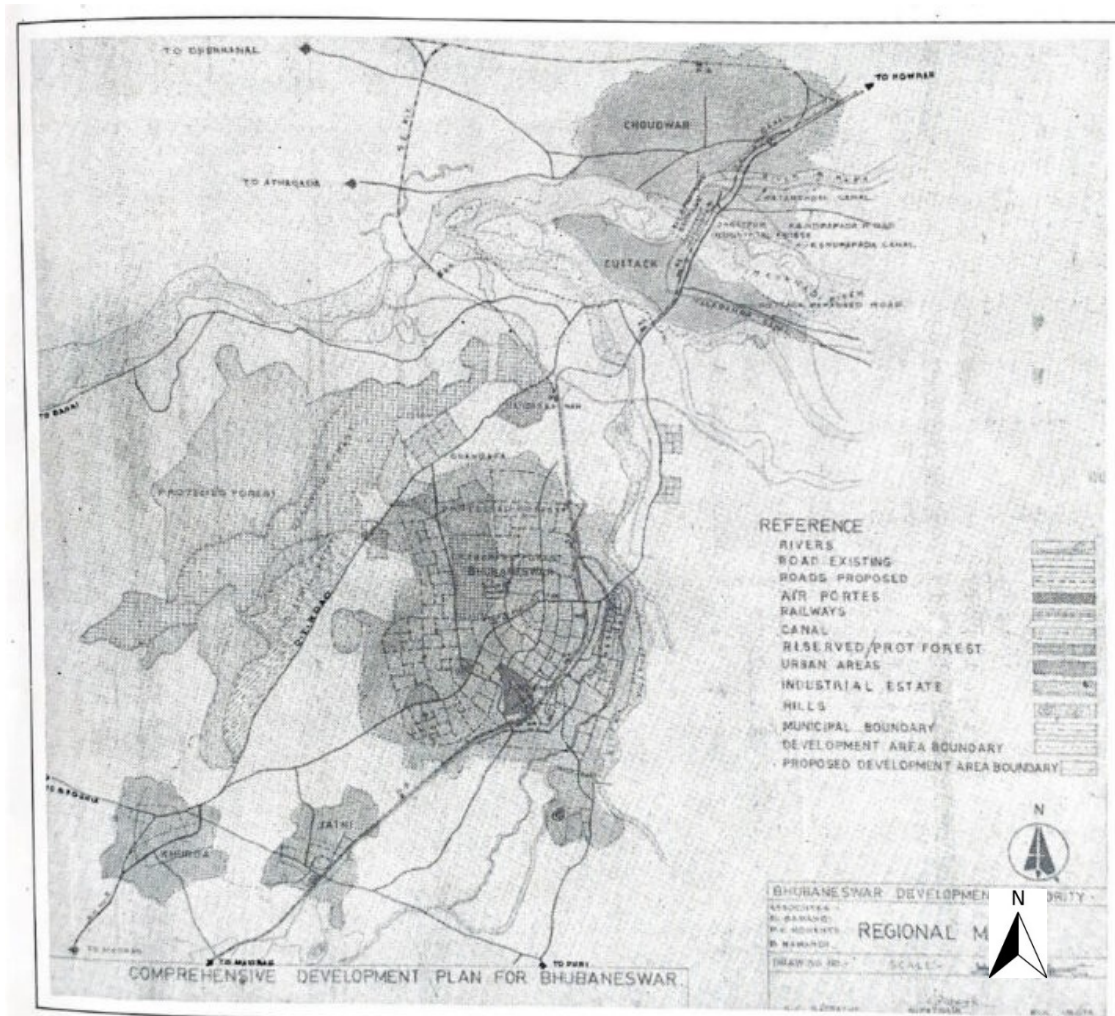


Figure 3.9: Map of Old Bhubaneswar; Source: <https://questionofcities.org/how-bhubaneswars-master-plan-was-overtaken-by-unsustainable-development/>

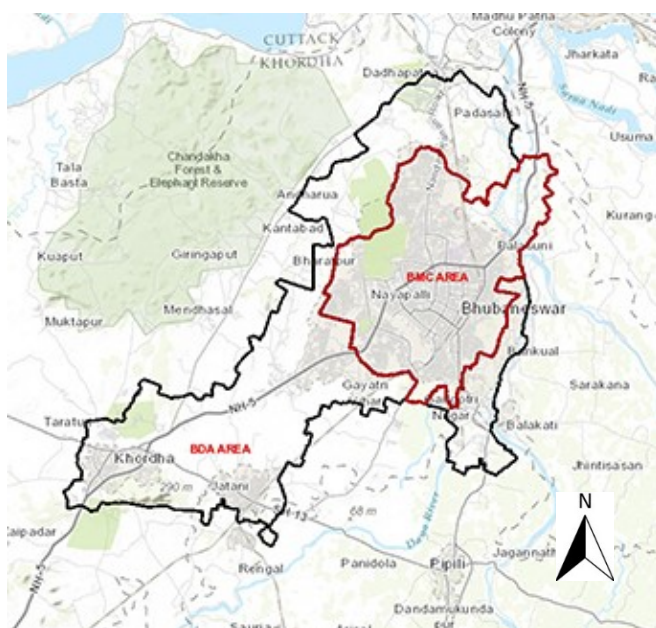


Figure 3.10 – Present day map of Bhubaneswar

Source: <https://questionofcities.org/how-bhubaneswars-master-plan-was-overtaken-by-unsustainable-development/>

Important Developmental Stages

1950s: During the first stage of development, government buildings, housing for government workers, and necessary infrastructure were built. Some of the first buildings constructed were the Assembly House, the Secretariat Building, and other administrative offices. The groundwork for Bhubaneswar's development as an operational state capital was laid during this time.

1960s–1970s: The city continued to grow as new public amenities, medical facilities, and educational institutions were built. During this period, prominent establishments such as the Capital Hospital and Utkal University were established, which helped Bhubaneswar become a center for healthcare and education. The creation of residential areas like Saheed Nagar and Bapuji Nagar gave the expanding population somewhere to live.

1980s–1990s: Bhubaneswar kept expanding while putting an emphasis on enhancing connectivity and infrastructure. Major road, bridge, and public transportation infrastructure projects improved the city's internal mobility and access to other regions of Odisha. The development of industrial regions like Mancheswar and Chandaka accelerated employment creation and economic expansion.

The Smart City Initiative in the Modern Era

From the 2000s to the present: Bhubaneswar saw a tremendous increase in modernization and urbanization at the turn of the century. There was a sharp increase in the erection of multiplexes, malls, and high-rise structures in the city. With the creation of Infocity and other technology parks, the IT industry started to thrive, drawing investments and generating job possibilities.

In 2015, Bhubaneswar was chosen as one of the initial 20 Indian cities to be built under the Smart City Mission. The project sought to improve the efficiency, sustainability, and livability of the city. A strong public transportation system, sophisticated traffic control, e-governance services, and the construction of green spaces and public areas were among the major initiatives.

Preservation of Culture and Heritage

In spite of the speed at which modernization was advancing, Bhubaneswar's rich cultural legacy was preserved. Initiatives were made to combine cultural conservation with urban growth, and historic sites such as Ekamra Kshetra were preserved. Bhubaneswar's reputation as a center of culture was upheld by the city's temples, customary celebrations, and cultural events.

Hub for Research and Education

Prestigious universities like the National Institute of Science Education and Research (NISER), the All India Institute of Medical Sciences (AIIMS), and the Indian Institute of Technology (IIT) Bhubaneswar are located in this educational powerhouse. These establishments have established the city as a hub for research and higher education, drawing scholars and students from all around the nation. Going forward, Bhubaneswar wants to strike a balance between sustainability and expansion. The improvement of infrastructure, raising living standards, and encouraging inclusive growth are the main objectives of the city's development goals. With the goal of making Bhubaneswar a model for urban development in India, smart city initiatives are still evolving.

The evolution of Bhubaneswar from a medieval temple town to a contemporary metropolis is a prime example of well-thought-out urban development. The city's journey positions it as a dynamic, forward-thinking, and energetic metropolitan hub,

demonstrating its ability to embrace modernization while conserving its rich cultural and historical history.

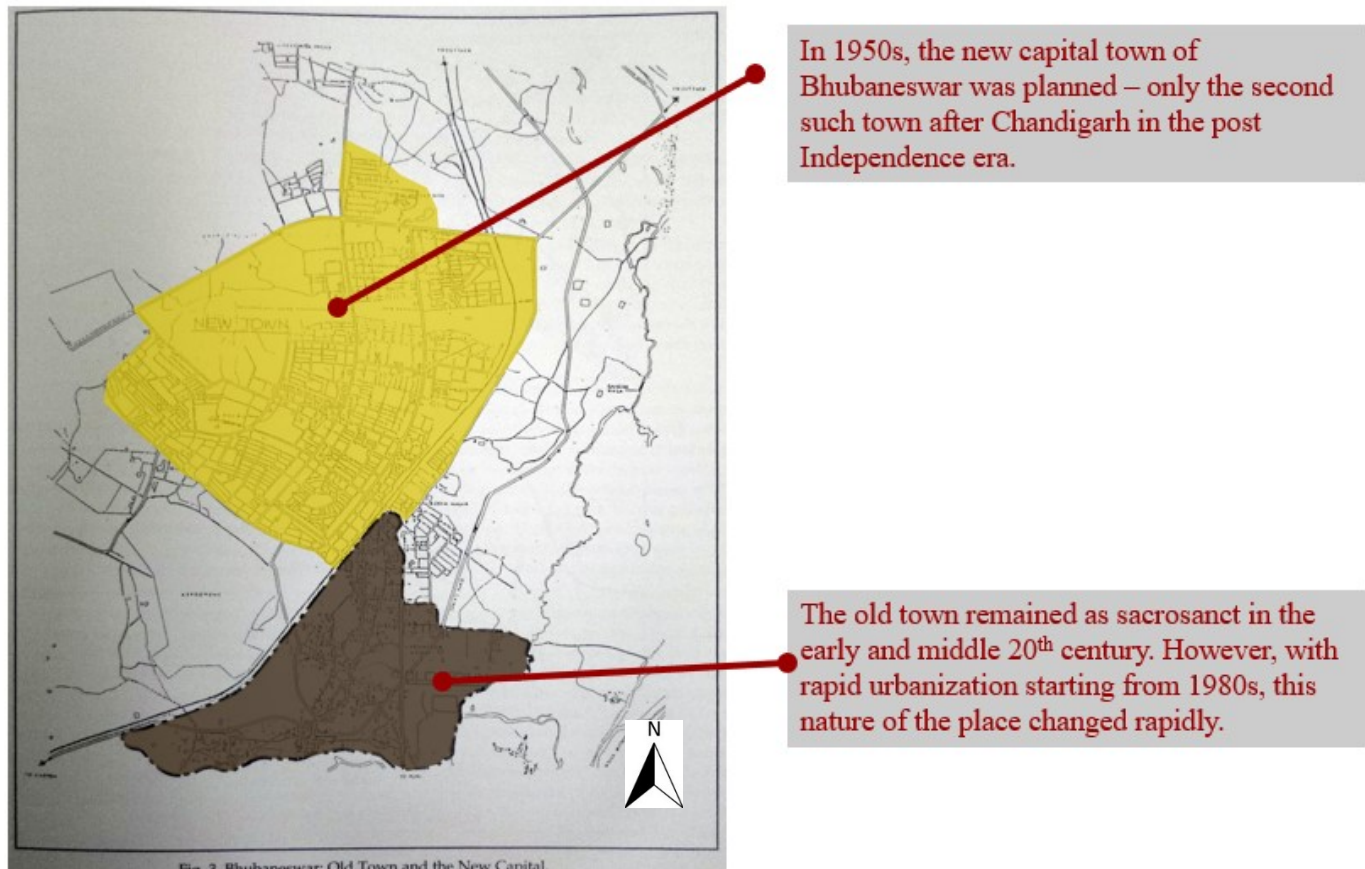


Figure 3.11 - Development of New Capital towns of Bhubaneswar

3.4. City of Puri

Situated on the eastern coast of Odisha near the Bay of Bengal is Puri, one of the most revered and ancient cities in all of India. Puri, which is mostly recognized for its religious, cultural, and architectural significance, has long been a popular pilgrimage site and a representation of the rich history of Odisha.

Religious and Historical Significance

Ancient Origins: Several Hindu scriptures and historical accounts make references to Puri's ancient history. It is thought to have been an important place of worship for more than two millennia. The Eastern Ganga dynasty's dominance over the city in the eleventh century contributed to its rise to prominence.

Jagannath Temple: The Jagannath Temple, which is devoted to Lord Jagannath, a manifestation of Lord Vishnu, and his siblings Balabhadra and Subhadra, is the center of Puri's religious significance. The temple, one of the Char Dham pilgrimage destinations, was constructed in the twelfth century by King Anantavarman

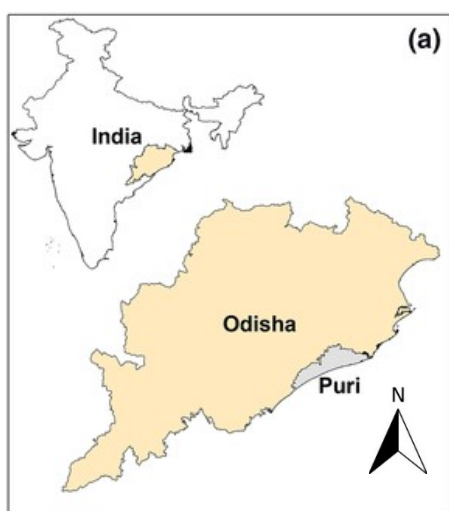


Figure 3.12 - Location of Puri



Figure 3.13 - Map of Puri

Chodaganga Deva and draws millions of people each year. The temple complex is well-known for its elaborate carvings, massive construction, and the magnificent Rath Yatra (Chariot Festival), which is one of India's biggest religious celebrations. It also features a 65-meter-tall spire.

Rath Yatra: The deities are transported to the Gundicha Temple in enormous chariots during the celebrated Rath Yatra, which takes place every July. The city is invigorated by the bright and spiritually charged atmosphere created by this event, which attracts millions of devotees and tourists from throughout the globe.

Gundiya Temple: The Rath Yatra's destination, Gundicha Temple is a few kilometers away from Jagannath Temple. The temple is a major stop on the pilgrimage route since it is thought that Lord Jagannath stays there for nine days during the celebration.

Beyond Puri's city limits, the Konark Sun Temple – a UNESCO World Heritage Site –

has strong ties to the city's religious community. Constructed in the 13th century, this amazing building is the pinnacle of Odishan architecture and is shaped like a massive chariot with finely carved walls, pillars, and wheels.

Beaches & Marine Drive: One of Puri's main draws for tourists is its extensive network of fine sandy beaches. A major tourist road, the Marine Drive connects Puri and Konark and offers beautiful views of the coastline.

Social and Economic Aspects

Travel: One of Puri's main economic drivers is travel. A robust economy centered on hospitality, handicrafts, and services is supported by the flood of pilgrims and tourists. The area is well-known for its traditional crafts, which include stone carvings, appliqué work, and Pattachitra paintings.

Local Economy: Small-scale enterprises, agriculture, and fishing sustain Puri's economy in addition to tourism. The lively local marketplaces provide a wide selection of handicrafts, trinkets, and religious items.

Modern Infrastructure Developments & Urbanization: To handle the increasing number of tourists and to raise the standard of living for its citizens, Puri has undergone considerable infrastructure development in recent years. Projects include construction of public facilities, improving waste management and sanitation systems, and extending roadways.

Environmental Concerns: Because Puri is a seaside city, it has to deal with issues like cyclone damage and coastal erosion. To safeguard the city's history and its inhabitants, efforts are being made to fortify disaster management procedures and use sustainable principles.

Upcoming prospects

Puri is now part of the Indian government's Smart City Mission, which aims to advance sustainable development, improve public services, and improve urban infrastructure. The Smart City Mission envisages the use of technology to improve resource, traffic, and tourism facility management.

Cultural Preservation: Puri's cultural legacy is being continuously promoted and preserved. The major goals of the initiatives are to preserve the historic buildings,

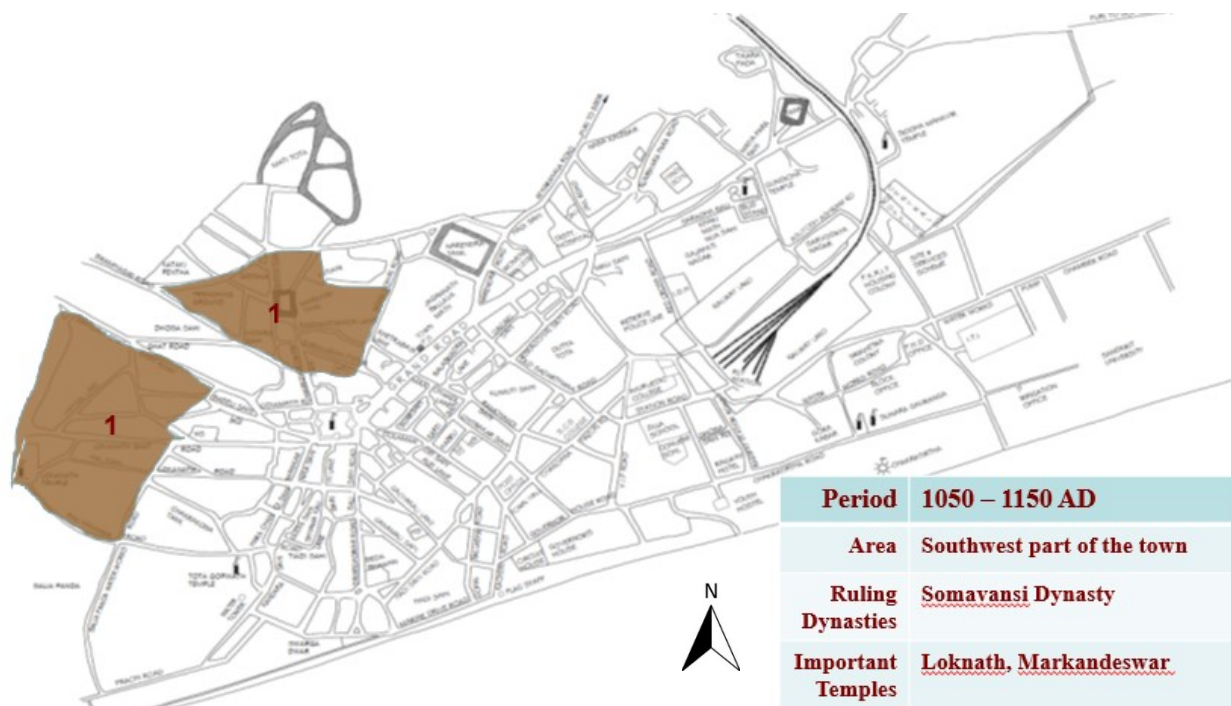


Figure 3.15- Map of Puri showing settlement from 1050 – 1150 AD

In Puri, important temples were built between 1050 and 1150 AD, which had a profound impact on the area's religious and architectural legacy. The legendary temple from this period is the Jagannath Temple, which was built by Eastern Ganga dynasty King Anantavarman Chodaganga Deva in the twelfth century. This magnificent temple, which is devoted to Lord Jagannath and his siblings Subhadra and Balabhadra, is a wonder of Kalinga architecture with elaborate carvings and a tall spire. Spanning 400,000 square feet, the temple complex consists of multiple smaller temples and is encircled by a tall fortification wall known as Meghanada Pacheri. Despite having a modest style, the Gundicha Temple is another noteworthy building from this era that is essential to the yearly Rath Yatra festival, during which the gods are transported thither in opulent chariots. These temples have a significant impact on the religious customs and practices of the area in addition to being places of worship and hubs for social and cultural activity. These temples are enduring emblems of the rich cultural history of Puri throughout this era because of its magnificent architecture and profound spiritual importance.

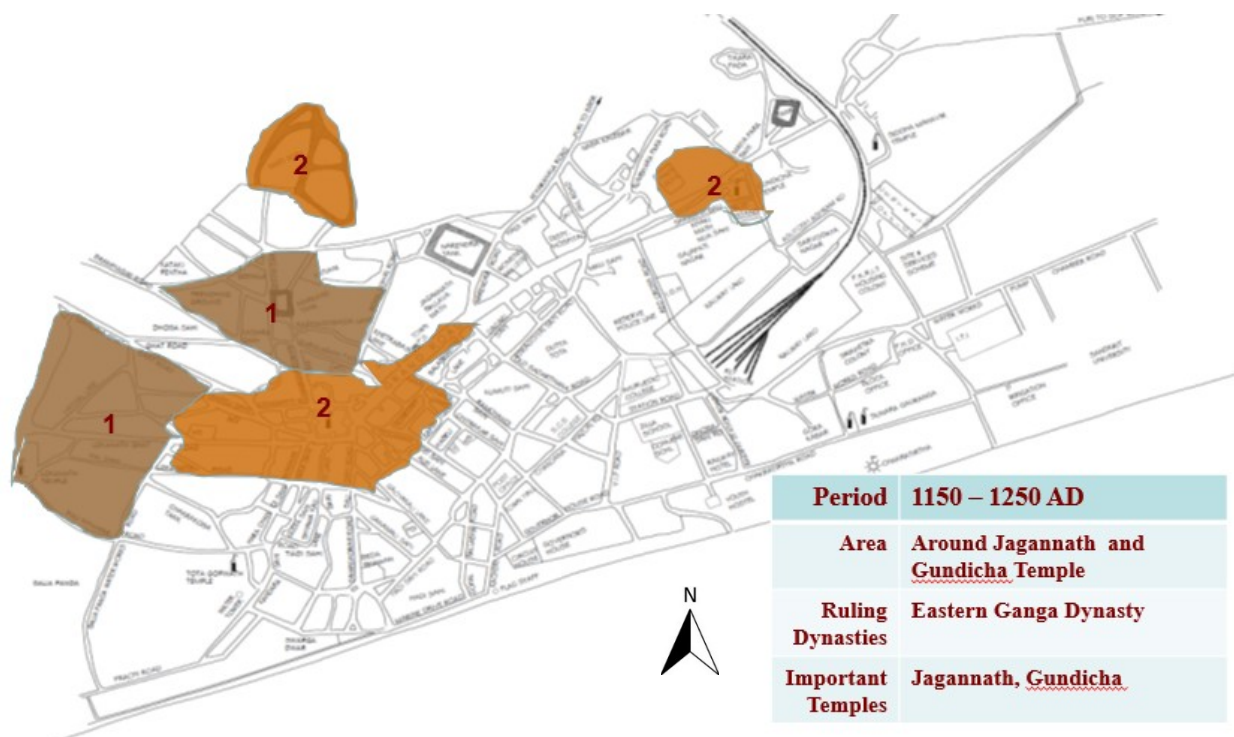


Figure 3.16- Map of Puri showing settlement from 1150-1250 AD

Puri continued to build temples throughout the years 1150–1250 AD, which strengthened the city's standing as an important religious hub. The Jagannath Temple, which was established in the previous century by King Anantavarman Chodaganga Deva, has undergone significant growth and development in this century. The temple complex's architectural beauty was further enhanced by the installation of several structures and shrines. Among other things, the building housed the Mukti Mandap, a gathering place for religious academics that functions as a center for theological debates and spiritual talks.

The Vimala Temple, which is housed within the Jagannath Temple complex and is devoted to Goddess Vimala, is another noteworthy temple from this era. Being one of the Shakti Peethas, sacred locations devoted to the Goddess Shakti, this temple is very significant. Throughout this time, the Kalinga architectural tradition—which is distinguished by its curved towers and elaborate stone carvings—was still reflected in the architectural style.

These temples played a crucial part in the religious life of the area by acting as hubs for culture and social interaction in addition to being places of worship. The building and ornamentation of these temples between 1150 and 1250 AD highlighted Puri's continued importance as an epicenter of devotion, spirituality, and fine architecture in Eastern India.

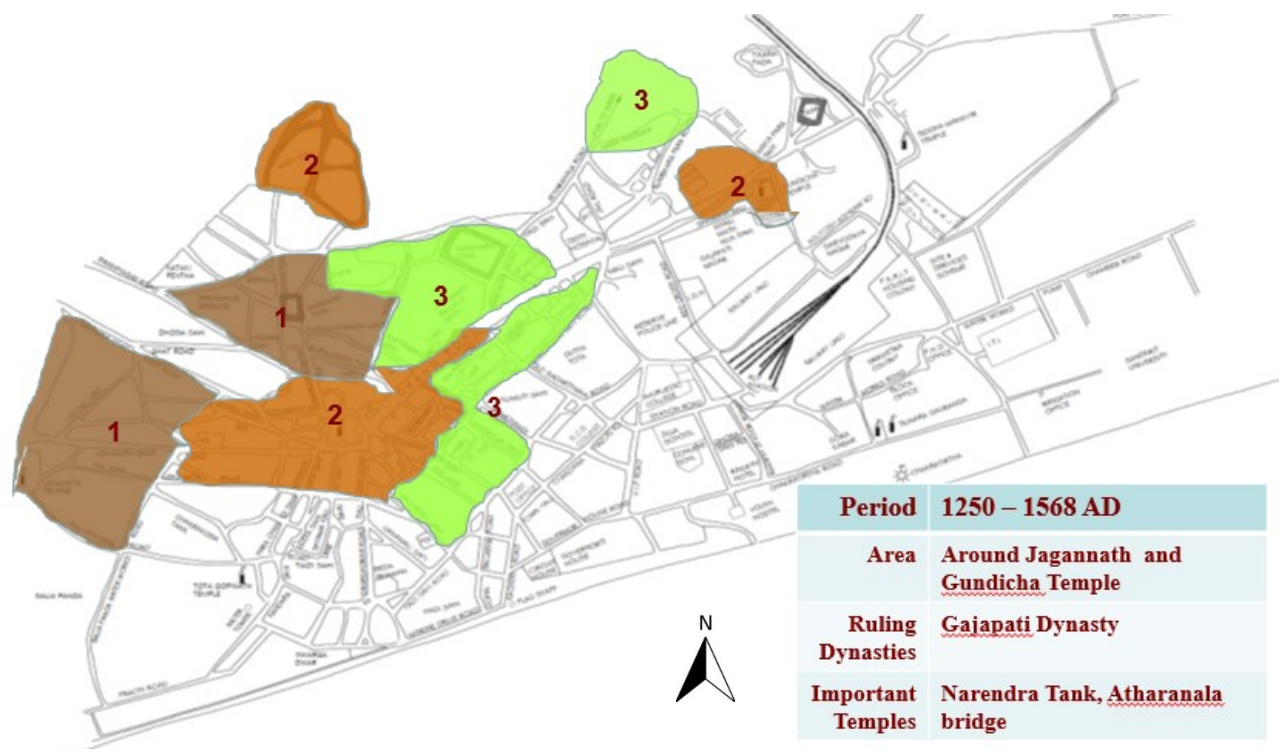


Figure 3.17 - Map of Puri showing settlement from 1250-1568 AD, showing extent during Gajapati dynasty rule

Puri saw important religious and architectural advancements between the years 1250 and 1568 AD, which enhanced the city's standing as a prominent pilgrimage destination. The Jagannath Temple remained the devotional focus, and new construction and renovations added to its magnificence. The expansion of the temple complex led to the addition of numerous subsidiary shrines, which improved the area's spiritual aura. The Sun Temple was built in the 13th century at Konark, about 35 kilometers from Puri, by King Narasimhadeva I of the Eastern Ganga dynasty.

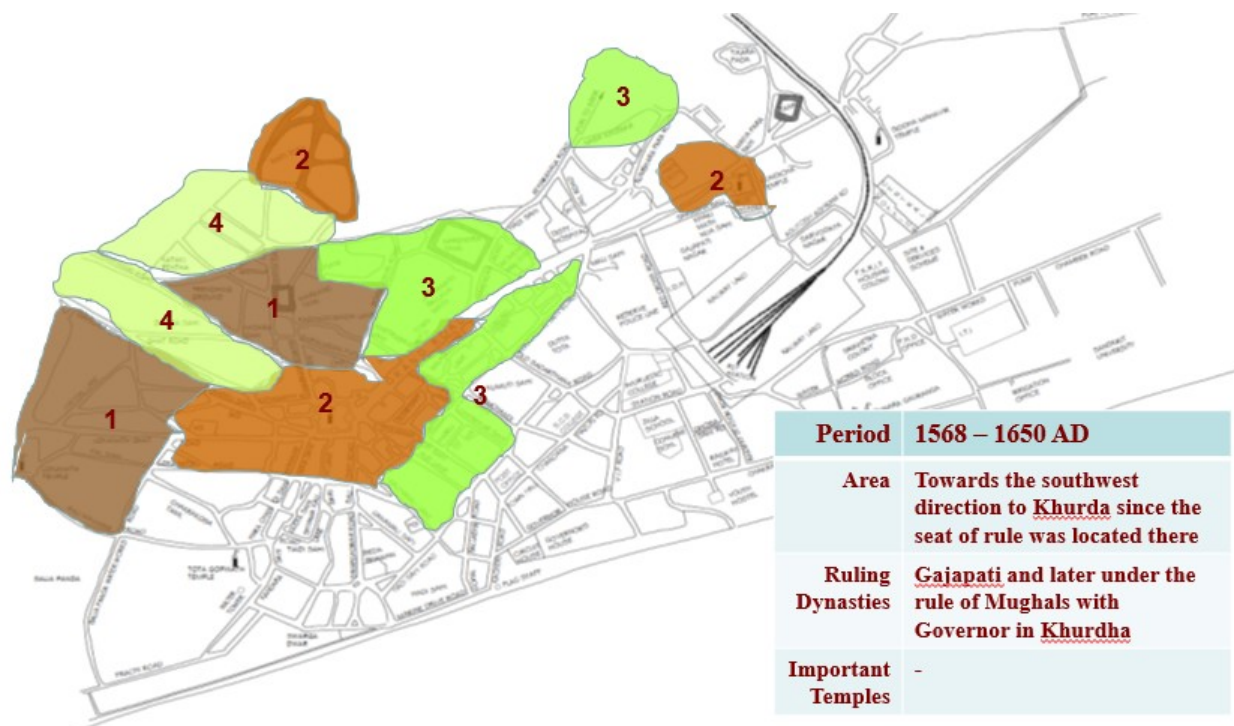


Figure 3.18- Map of Puri showing settlement from 1568 – 1650 AD

After the turbulent events of the preceding century, Puri saw a period of resilience and reconstruction for its temples between 1568 and 1650 AD. Following the destructive Kalapahad invasion in 1568, which severely damaged the Jagannath Temple and other religious buildings, attempts were undertaken to bring these hallowed locations back to their former splendor and holiness. The Jagannath

Table 3.3 - Important Temples and Ruling Dynasties

<u>Period</u>	<u>Area</u>	<u>Ruling Dynasty</u>	<u>Important Temples</u>
1050 – 1150 AD	Southwest part of the town	Somavansi Dynasty	Loknath, Markandeswar
1150 – 1250 AD	Around Jagannath and Gundicha Temple	Eastern Ganga Dynasty	Jagannath, Gundicha
1250 – 1568 AD	Around Jagannath and Gundicha Temple	Gajapati Dynasty	Narendra Tank, Atharanala bridge
1568 – 1650 AD	Towards the southwest direction to <u>Khurda</u> since the seat of rule was located there	Gajapati and later under the rule of Mughals with Governor in <u>Khurdha</u>	

Temple's rebirth and rebuilding were greatly aided by the Bhoi dynasty, especially under King Ramachandra Deva I. He started a major restoration project, restoring the temple's status as Puri's spiritual center and reintroducing the customs.

Key finding: Applying Conzen's morphological framework, Puri's transformation reflects a persistent core of sacred spatial organization, despite modern infrastructural pressures.

3.5. City of Cuttack

Said to be the "Millennium City" and the "Silver City" because of its rich history and magnificent silver filigree work, Cuttack is one of the oldest cities in Odisha. Since its founding in the tenth century, Cuttack has played a key role in politics, trade, and

culture. Situated at the meeting point of the Mahanadi and Kathajodi rivers, the city presents a distinctive fusion of modern development and historical legacy.

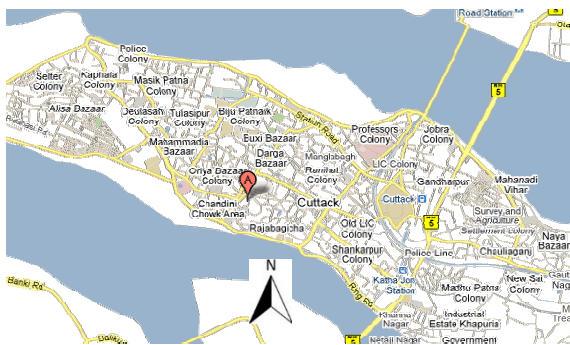


Figure 3.19 - Location of city of Cuttack

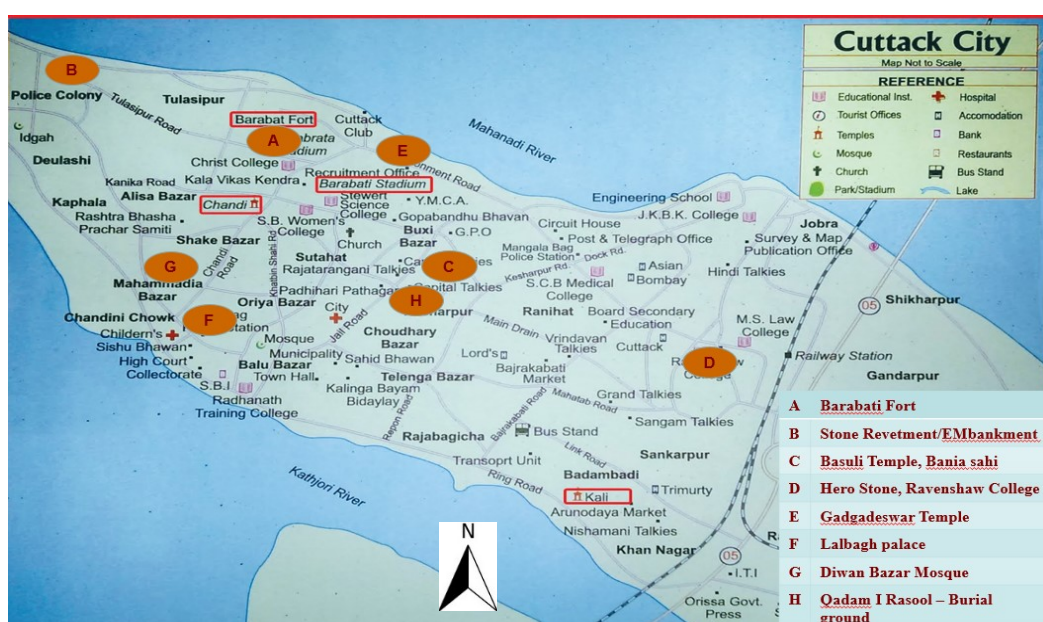


Figure 3.20 – Historic settlements of Cuttack

Historical Importance of the Classical and Ancient Eras:

Foundation: King Nrupa Kesari of the Keshari dynasty founded Cuttack in 989 CE. For more than nine centuries, it was the capital of Odisha, during which time the Keshari, Ganga, and Gajapati kingdoms rose and fell.

Barabati Fort: One of the best examples of Cuttack's historical significance is the 14th-century Barabati Fort. The remnants of the Ganga dynasty-built fort, with its striking moat and nine-story palace, showcase the era's architectural prowess. The fort served as a significant administrative and military hub.

From 989 to 1238 AD, the Somavamshi dynasty's King Nrupa Kesari laid the



Figure 3.21 –Cuttack map showing settlement from 989-238 AD

foundation for the city of Cuttack, which saw substantial development during that time. Because of its strategic location at the meeting point of the Mahanadi and Kathajodi rivers, it developed into an important military and administrative hub. Because of its location on important trade routes, Cuttack prospered as a center of trade and commerce during the rule of the Eastern Ganga dynasty. Cuttack's significance as a political and cultural hub was further cemented with the building of the Barabati Fort in the 13th century, which laid the groundwork for the city's future expansion.

Cuttack had tremendous expansion and development between the years of 1238 and 1568 AD, especially during the tenure of the Suryavanshi Gajapati monarchs and the Eastern Ganga dynasty. As the state's capital, the city promoted developments in politics, the arts, and the economy. With its strong defenses and constructions, the strategically important Barabati Fort remained a key location. Cuttack attracted academics and artists as it developed into a significant hub for trade, the arts, and education. The prosperity of the city and its significance as an administrative and cultural center in eastern India were reflected in the construction of temples and other structures during this time.

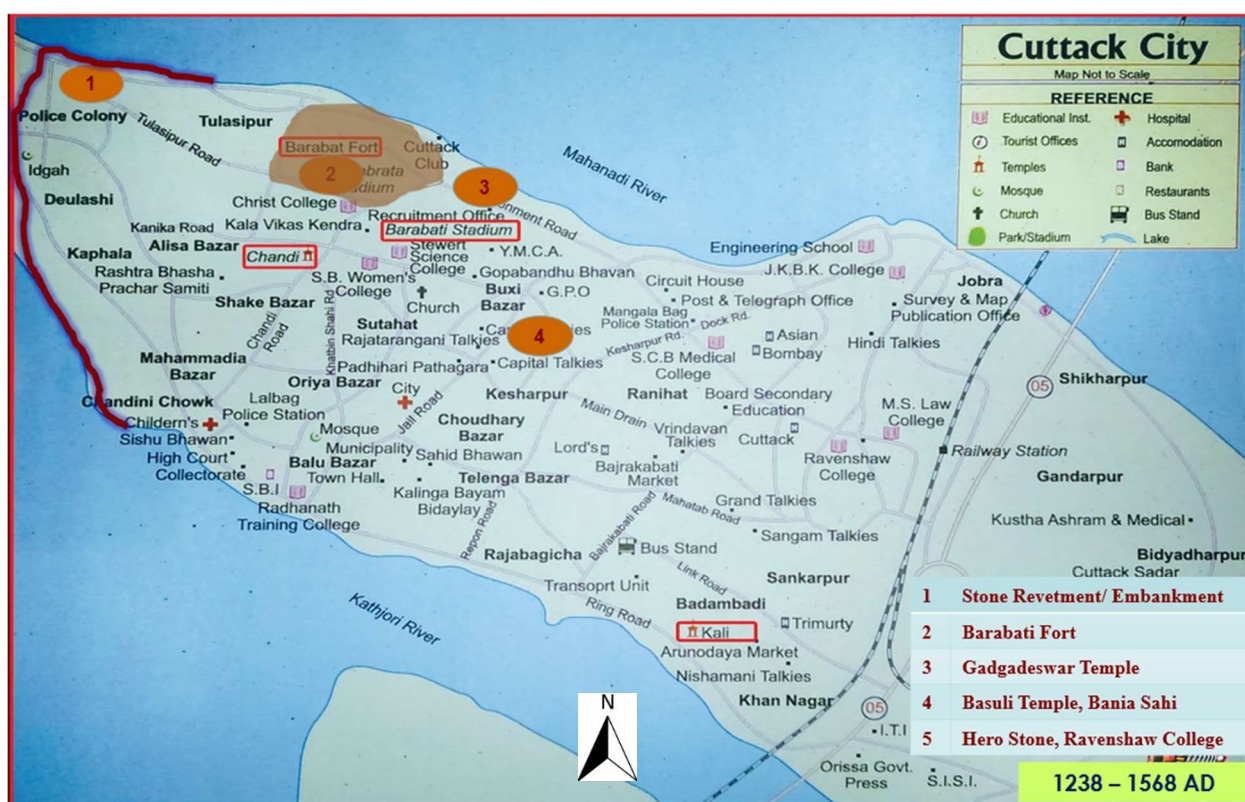


Figure 3.22–Cuttack map with settlement from 1238 - 1568 AD



Figure 3.23 – Cuttack map with settlement from 1568 -1750 AD

Cuttack went through a difficult but transforming period from 1568 to 1750 AD. After the Gajapati Empire collapsed and the Mughals conquered the area in 1592, the city grew to become an important military and administrative center. To improve trade and government, the Mughals built new infrastructure and strengthened Barabati Fort. Cuttack's economy and cultural life were rejuvenated when Maratha control was established in the middle of the 18th century. Throughout this time, the Marathas created markets, enhanced water management systems, and encouraged the arts and crafts, turning Cuttack into a thriving center of commerce and culture in Odisha.

Under Maratha administration from 1750 to 1803, Cuttack underwent significant developments, followed by British influence. The Marathas created markets and encouraged trade while also improving the administrative and economic framework of the city. An important change occurred when Cuttack was brought under British rule in 1803, after the Second Anglo-Maratha War. Modernization initiatives began when the British established Cuttack as the British East India Company's headquarters in Odisha. They developed the city's port facilities, constructed roads, and enhanced

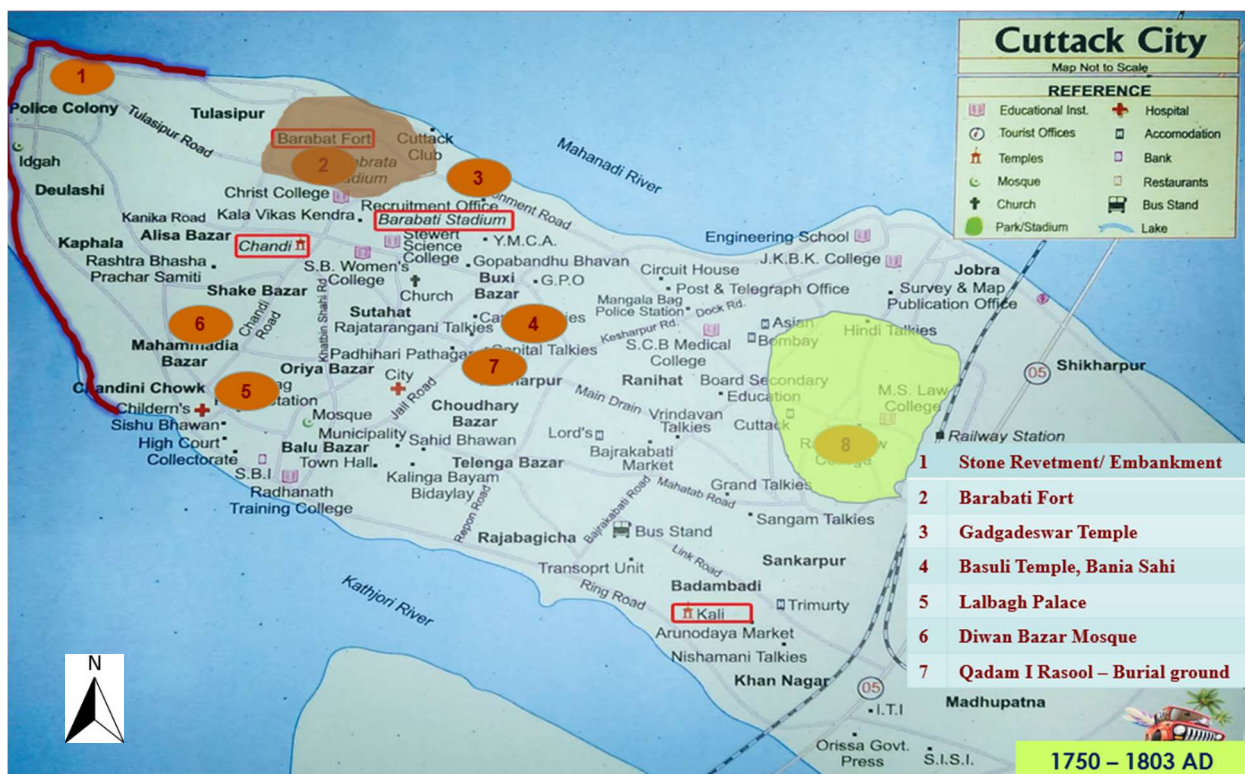


Figure 3.24 – Cuttack map with settlement from 1750-1803 AD

administrative processes. The foundation for Cuttack's development into a significant administrative and commercial hub under British rule was built during this time.

Colonial Era:

British Rule: Cuttack maintained its importance as a commercial and administrative hub when under British rule. The establishment of numerous institutions by the British, like as hospitals, colleges, and schools, aided in the growth of the city. One of the earliest schools in Odisha was founded in 1868 and is currently known as Ravenshaw University. (Praharaj, 2012)

Trade and Commerce as an Economic and Commercial Hub:

Silver Filigree: "Tarakasi," or delicate silver filigree art, is a specialty of Cuttack. This age-old craft entails making exquisite jewelry and ornaments that are highly valued both domestically and abroad.

Markets and Industries: The city boasts a thriving business community with well-known marketplaces such as Malgodown, one of the biggest wholesale markets in the state, and Buxi and Choudhury bazaars. Several small and medium-sized businesses, including as those in the food processing, leather, and textile industries, are also based in Cuttack.

Festivals and Culture at the Cultural and Educational Center:

Durga Puja: Cuttack is well-known for its magnificent pandals and gorgeous silver and gold jewelry that adorn the idols during the major Durga Puja celebrations. Visitors come to the festival from all around the state and beyond.

Bali Yatra: This ancient sea festival honors the historical trading connections between Southeast Asia and Odisha. The Bali Yatra, which celebrates Cuttack's rich legacy, is held on the banks of the Mahanadi River and includes cultural events, traditional crafts, and food vendors.

Academic Establishments:

One of the oldest and most esteemed colleges in Odisha, Ravenshaw University was first founded as Ravenshaw College in 1868. The state's intellectual landscape has been significantly shaped by the university.

SCB Medical College: Established in 1944, the SCB Medical College and Hospital is one of Odisha's top medical facilities, offering cutting-edge treatment as well as medical education.

Infrastructure and Contemporary Development in Urban Growth:

Transportation and Connectivity: Cuttack has excellent air, rail, and road connectivity. The city is connected to the National Highway system and is a significant railway junction. (Mishra, 1989) Air travel is made easier by the adjacent Biju Patnaik International Airport in Bhubaneswar.

Healthcare and Amenities: Cuttack is home to a number of facilities that offer comprehensive medical services, such as the SCB Medical College and Hospital. The infrastructure of the city, which includes public utilities, roads, and bridges, has been improved, improving the standard of living for its citizens.

Difficulties and Opportunities for the Future

Urban Difficulties:

Floods: Due to its location between two rivers, Cuttack is vulnerable to floods, especially in the monsoon season. There is constant work being done to enhance drainage systems and put flood control measures in place.

Urban Congestion: Cuttack faces problems with urban sprawl and traffic congestion

due to its large population. To address these issues, plans are being explored for satellite township development and infrastructure expansion.

Prospective Progress:

Smart City Initiatives: Cuttack is a member of the Smart City Mission, which uses technology to improve public services, encourage sustainable development, and improve urban infrastructure.

Cultural Preservation: Initiatives to support historical monuments, traditional crafts, and cultural festivals are just a few of the ways that Cuttack's rich cultural history is being preserved and promoted.

Conclusion

With its rich cultural heritage and extensive historical roots, Cuttack is still an important and active city in Odisha. It is a distinctive and enduring metropolitan center because of its unique blend of tradition and modernity, as well as its strategic economic and educational importance. Cuttack continues to treasure and celebrate its rich history while navigating the challenges of contemporary urbanization, guaranteeing a bright future for both locals and tourists.

Table 3.4 - Ruling Dynasties and Important Structures

<u>Period</u>	<u>Area</u>	<u>Ruling Dynasty</u>	<u>Important Structures</u>
989 – 1238 AD	West part of the city	Somavansi dynasty	<u>Barabati Fort</u> , <u>Stone Revetment/ Embankment</u>
1238 - 1568 AD	North and west part of the city	Eastern Ganga dynasty Gajapati Dynasty	<u>Gadgadeswar Temple</u> , <u>Basuli Temple</u> ,
1568 - 1750 AD	Central and southern part of the city	Bengal <u>Afgans</u> , <u>Mughals</u>	<u>Lalbagh Palace</u> , <u>Diwan Bazar Mosque</u> , <u>Qadam Rasool</u>
1750 – 1803 AD	Eastern part of the city	Marathas	Cantonment area of <u>Chauliaganja</u> , <u>Hero Stone</u> – <u>Ravenshaw College</u>
1803 – 1947 AD	Southern and eastern parts of the city in pockets	British Empire after the 2 nd Maratha War	Missionaries, <u>Curches</u> , <u>Schools</u> , <u>Colleges etc</u>

3.6. Comparative:

Table 3.5 shows how the cities of Bhubaneswar, Puri and Cuttack have developed over time today.

Table 3.5: Comparison of aspects of development of Bhubaneswar, Puri and Cuttack			
Aspect	Bhubaneswar	Puri	Cuttack
Historical Significance	With historic temples that date back to the seventh century, it is referred to as the "Temple City of India".	Renowned for the Jagannath Temple, a significant pilgrimage site with a millennium of history.	With a significant Mughal influence, this historic city is renowned for the Barabati Fort and its old walls.
Urban Development	Quickly upgrading while utilizing IT hubs and planned development. Notable increases in infrastructure and real estate.	Comparatively slower pace of urban development, emphasizing infrastructure for pilgrimages and tourism.	Development that strikes a balance between preserving the past and fostering contemporary urban expansion.
Economic Growth	Expanding quickly while concentrating on IT, education, and business. key economic centre in Odisha.	Primarily motivated by religious and tourism activities.	Known for trade and commerce in the past, it is currently growing in the industrial and educational sectors.
Infrastructure	Improved transportation (Bhubaneswar Airport, BRTS system) and educational institutions are examples of modern facilities.	Pay attention to improving places of worship and the infrastructure supporting tourists (roads, hotels).	Constructing infrastructure while enhancing public services and transportation (Cuttack Airport, roads, etc.).

Key Finding: While Bhubaneswar evolved through planned post-independence urbanism, Puri and Cuttack exhibit layered urban morphologies shaped by religious and colonial legacies.

3.7. Conclusion

Bhubaneswar, Cuttack and Puri are the three significant historic towns in the current state of Odisha. Each city has been formed with a set of defined need and use. These towns have evolved over the ages and have now developed into major urban centres in the state.

Puri and Cuttack have still been able to retain some part of its original urban integrity. Puri still remains a hotbed of religious tourism revolving around the Jagannath Temple. Till date, even after the urban sprawl of this temple settlement, the major focus of development has been the Temple Area. Similarly, Cuttack which evolved as a military town, remained as an Administrative Capital of kingdoms through the centuries for a significant period, even during the British rule and independent India, until the formation of the new capital town of Bhubaneswar. However, the integration of Smart City policies into heritage towns like Puri and Cuttack presents a paradox – modernization initiatives risk intangible cultural landscapes, unless culturally adaptive planning models are adopted.

Bhubaneswar, amongst all the urban centers in Odisha reflects a varied nature of development. Historical mention of the region from the Ashokan era until 17th century as the administrative and religious capital of dynasties provide the settlement distinct features in a manner reflected through its temple art, developing a special temple architecture – the Kalinga temple form. The place remained majorly in shadow after in the following centuries till it was selected as the new capital of Odisha. Being the 2nd planned city of independent India, it always holds a special account in urbanization. The city has eventually transformed from a Temple city to Capital city. The city has continuously evolved since independence and has remained in highlight of development in Odisha. Thus, Bhubaneswar provides a suitable example for study of urban impact in the historic fabric of the city.

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4. Perception of Temple Town in Odisha – Study of Bhubaneswar

4.1. Introduction

With a treasure trove of Hindu, Buddhist, and Jain sculptures, Odisha's cultural legacy is most vividly expressed in its heritage cities of Bhubaneswar, Cuttack, Puri, and Konark (Das, 2019). Religion is the cornerstone of Indian society, permeating every aspect of national life. The diverse religious and socio-cultural landscape has given rise to a variety of sacred structures and associated settlements. Over time, the temple evolved into a focal point not only for spiritual practices but also for civic and social interactions.

Temple towns served as multifaceted hubs, encompassing religious, cultural, and economic functions (Mohanty, 2003). Beyond their spiritual significance, these precincts fostered intellectual discourse and artistic expression. Simultaneously, they drove the local economy through commerce and trade. Rooted in the belief of cosmic creation originating from a central point, these centers held profound spiritual importance. As focal points of community life, they represented realms of sacred and absolute truth.

A city's core is shaped by its historical context, which imbues it with a unique character (Mishra, 1989). This identity is dynamic, evolving over time rather than being static. Consequently, the core must be adaptable while maintaining control over its transformation. Its form and appearance are influenced by its past, present functions, and future aspirations. Every settlement bears the marks of its history, but the core is particularly significant as it defines a place's distinctive identity.

Just as an industry serves as the economic backbone of an industrial town, a temple is the spiritual and cultural heart of a temple settlement. It acts as a guiding force, shaping the community's beliefs, behaviors, social interactions, and cultural practices (Mishra, 1989).

Elements of the Historic Precincts

- The temple, or primary religious structure, is the nucleus of a religious precinct. From this central point, the city organically develops, creating a self-contained urban network.
- Sacred sites emerged as the culmination of symbolic expression, laying the groundwork for organized religion. Myths evolved into philosophical systems, rituals transformed into cultural practices, and symbols found their ultimate expression in art and architecture. Distinctive elements such as towering Gopurams, carefully planned processional paths, contrasting scales in grand temples, and the arrangement of surrounding settlements reflect a deliberate hierarchy of sacred spaces and ritual actions (Rajkumari, 2019).
- Festivals, processions, and rituals are integral to the life of temple precincts. These celebrations often culminate in festive fairs. A key component of many festivals involves the ceremonial procession of temple deities, encompassing circumambulation of the temple, sacred water bodies, and even the city itself.
- The sacred territory, or Kshetra, is defined by a combination of natural features, such as sacred water bodies (tirthas), the functions of holy sites, and their association with primary temples. Its importance lies in creating a meaningful and interconnected spatial framework that underpins the city's religious identity (Mishra, 1989).
- Hinduism and Indian society are structured upon a hierarchical principle, categorizing everything from inanimate objects to deities on a graded scale. This hierarchical worldview extended to human society, resulting in a caste system based on socioeconomic status. The four primary castes—Brahmin, Kshatriya, Vaishya, and Shudra—were interdependent components of a cohesive religious system (Jha, 2018).
- Similarly, temples and their presiding deities were ranked hierarchically. Larger, more elaborate temples housed principal deities, while smaller shrines were dedicated to lesser divine figures (Jha, 2018).
- Temple complexes are dynamic spaces that blend religious practices with commercial activities. Often, these two spheres intersect. The existence of

religious centers and their associated rituals stimulates economic growth and job creation in the local community. Contemporary temple management involves diverse strategies, including land leases to artisans in exchange for rent or services. Pilgrimage and festivals enhance the temple's reputation and contribute to its overall significance (Rajkumari, 2019).

The Urban forms of religious precincts include: (Mishra, 1989)

- a. Intense religious and commercial activities at temple entrances have led to the formation of bustling hubs or nodal points.
- b. Modern transportation has eroded the symbolic meaning of processional paths and public squares within temple complexes.
- c. Religious towns exhibit a clear hierarchy of spatial scale, with temple enclosures dominating the skyline through their imposing architecture and expansive open spaces.
- d. Urban spaces within these towns are shaped by cultural values, religious practices, and social structures.
- e. Nearly all pilgrimage destinations are renowned for specific crafts or artisanal traditions.
- f. Temple towns feature a compact layout with residential and institutional buildings primarily occupied by those involved in temple affairs. Commercial establishments often form linear stretches along pilgrimage routes. Religious accommodations like dharamshalas and mathas are typically situated near the main temple.

4.2. Bhubaneswar and Ekamra Kshetra:

The city boasts a history dating back to the 6th century BC. Established as the modern capital in 1948, it now showcases a contemporary urban landscape characterized by modern architecture and planned neighborhoods (CDP, 2010).

4.2.1 Important Developments:

- Old Town (7th Century onwards): The Old Town of Bhubaneswar has been a major force in Hindu Culture and have been one of the biggest tourist attraction in Odisha.
- Sachivalaya (1956): The Capital City foundation was laid through this building. This was the start of the transformation from Temple Town to Capital Town.
- Railway Station (1956): Connectivity to different part of the city and invitation to infrastructure development started with it.
- Nandankanan Zoo (1960): The Zoo post its establishment added a new dimension of recreation to the city.
- Baramunda Bus Stand (1990): This Bus Stand was a catalyst for development in new areas of Bhubaneswar like Ghatikia & Jagamara.

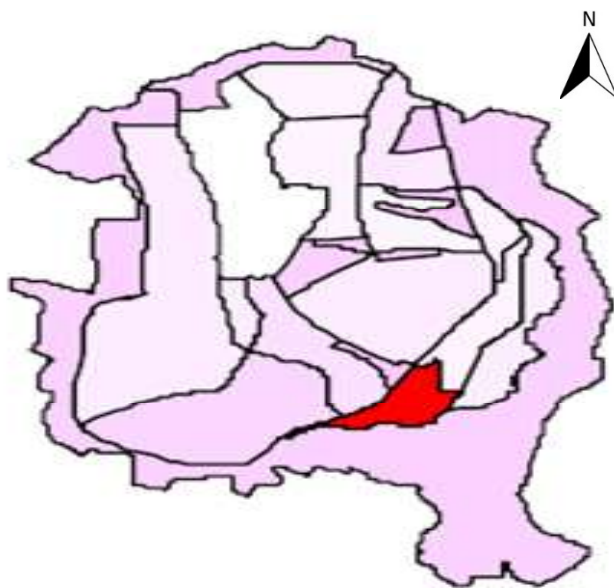


Fig 4.1: Red area marking Bhubaneswar up to 1930;
Source: Bhubaneswar CDP, 2011

4.2.1. Stages of development – from temple town to capital city:

1. The Temple Town up to 1930

- Seat of culture for 2,500 years.
- Area of 510 hectare
- Conglomeration of temples, monuments, mandaps, heritage ponds etc.
- Initially 1000 temples
- Presently, 320 temples.

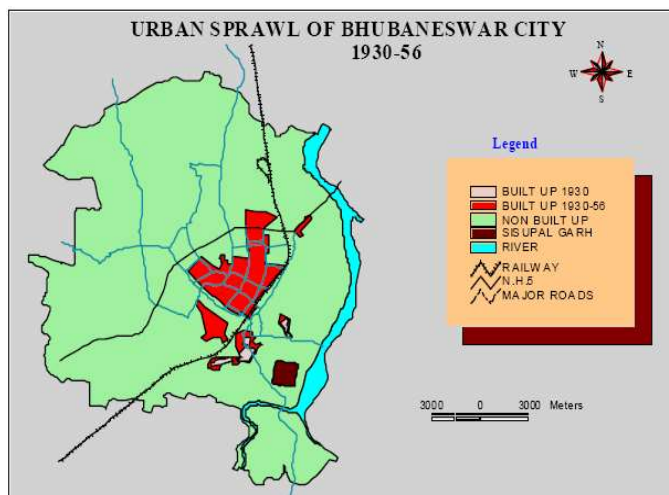


Fig. 4.2 Urban Sprawl of Bhubaneswar 1930-56

Source: Bhubaneswar CDP, 2011

2. The New Capital, 1930 – 1956:

- On 13th April 1948, the foundation stone of present capital township laid.
- In close proximity of the old temple town designed by architect Dr. Otto. H. Koenigsberger in 1954 on neighbourhood planning concept
- The capital town was planned in 1948 and was built between 1948

and 1961 at a respectful distance from the temple town with no conscious steps taken to preserve the individual identities of each.

3. Growth of Institutions, 1956 - 1968

- Major administrative activities like secretariat, heads of departments and similar government offices came up.
- Salubrious climate, availability of suitable land attracted a number of state level and regional institution
- With the growth of population, the need for developing residential areas both in private and organized sectors developed.
- The perspective growth of some of the major functions of the city, and the inter-relationship among them do not seem to have been considered.

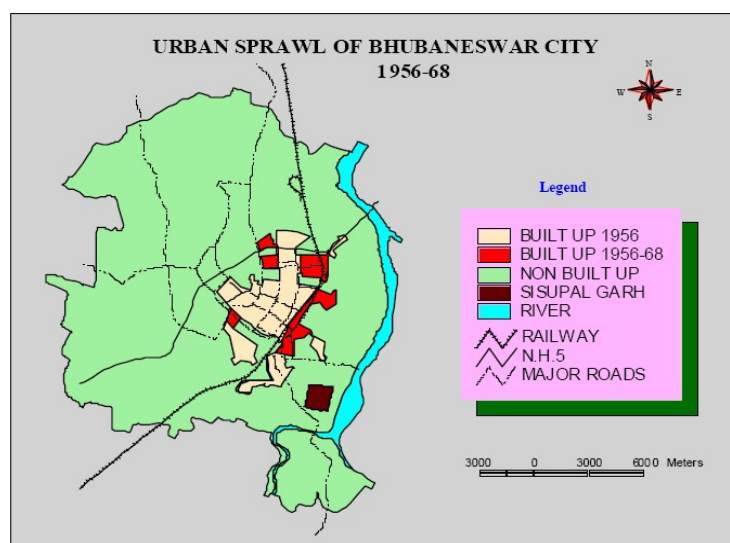


Fig. 4.3: Urban Sprawl of Bhubaneswar 1956-68

Source: Bhubaneswar CDP, 2011

4. Development in Organised Sector, 1974 onwards

- Constitution of the Bhubaneswar Regional Improvement Trust (BRIT) in 1976 and subsequently the Bhubaneswar Development Authority (BDA) in 1983
- Shortage of Government land and economy of scale contributed to construction of multi-storeyed flats and institutional buildings.

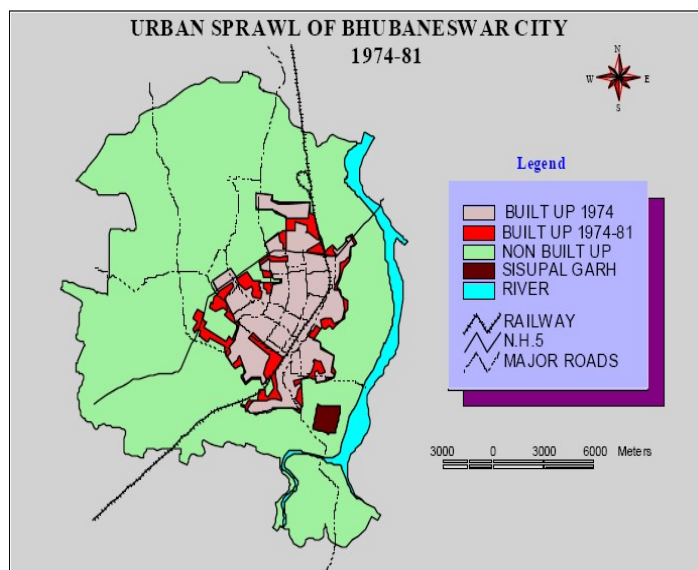


Fig. 4.4: Urban Sprawl of Bhubaneswar 1974-81
Source: Bhubaneswar CDP, 2011

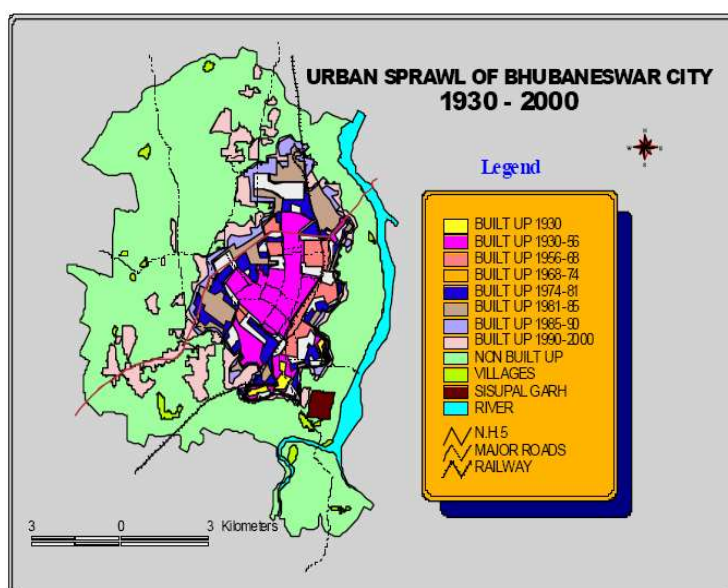


Fig. 4.5 Urban Sprawl of Bhubaneswar 1930 -2000
Source: Bhubaneswar CDP, 2011

5. The City Today

- Present township of Bhubaneswar sprawls over 233 sq. km. comprising of total number of 2312 revenue villages.
- City has extended in seven different directions during the last few decades by engulfing the fringe villages.

This extension has got varied length and dimensions from the

core of the original town, which has been supposed to lie at the Lingaraj temple area.

As Odisha's urban centers, Bhubaneswar and Cuttack are experiencing rapid growth, leading to severe space constraints. Development has shifted towards bypass road areas, where skyscrapers, shopping malls, and modern housing complexes are

emerging. This mixed-use development, while providing contemporary amenities, is gradually eroding the traditional character of both cities.

4.2.2. Three Key Attributes of Bhubaneswar (Mishra, 1989):

1. **State Capital and Economic Powerhouse:** Bhubaneswar functions as the administrative and economic epicenter of Odisha, driving tertiary sector growth.
2. **Emerging Regional Hub:** As a rapidly developing city, Bhubaneswar is expanding its influence beyond the capital, fostering a network of smaller urban centers through industries, services, and trade.
3. **Cornerstone of the Golden Triangle:** Situated 64 kilometers from Puri, Bhubaneswar forms the apex of Odisha's renowned Golden Triangle, a tourist circuit encompassing Konark and Puri.

4.2.3. Lingaraj Temple and its vicinity:

Bhubaneswar's history is deeply intertwined with the ancient kingdom of Kalinga (Bhuyan, 2017). Serving as its capital from the 3rd century BC to the 1st century AD, the city gradually ceded its political prominence but emerged as a prominent Shivaite pilgrimage center. Under royal patronage, it transformed into a temple city adorned with numerous shrines, a legacy it continues to uphold today. However, the modern face of Bhubaneswar is embodied by New Bhubaneswar, which has assumed the role of Odisha's capital, driving political, economic, and cultural growth.

Archaeological evidence underscores Bhubaneswar's status as one of India's oldest continuously inhabited sites. The region's significance is highlighted by events like Ashoka's conquest of Kalinga and the subsequent development of the Kalinga style of architecture (Jha, 2018).

Known as Ekamra Kshetra, Old Bhubaneswar was a remarkable temple city where the North Indian Nagara style of architecture reached its zenith, exemplified by the majestic Lingaraj Temple. Despite the ravages of time, hundreds of temples still stand, attracting countless devotees and sustaining local livelihoods (Garnayak, 2007).

Until the 20th century, the city was confined to its historic core, a treasure trove of architectural, cultural, and natural heritage. The traditional layout centered around

the Asta Ayatana, a complex of temples and water bodies, providing a spiritual and spatial framework for the city (Mishra, 1989).

The Impact of Urbanization on Temple Precincts - The accelerating pace of urbanization necessitates careful planning and conservation efforts for religious centers and their surrounding precincts within temple cities.

Beyond Isolation: Fostering Connection - Contrary to the notion of religious spaces as isolated ivory towers, it's crucial to shape the physical environment of these sacred places in a way that supports their intended purpose. This means fostering a vibrant and interconnected environment within the temple precincts, allowing for the consolidation of rituals and cultural activities.

Integration for Meaning - Furthermore, integrating the structure of the precinct with the overall urban layout is essential. This creates a sense of coherence and imbues the sacred area with a clear theme and meaning. By ensuring a harmonious relationship between the temple complex and its surroundings, we can safeguard the cultural and spiritual significance of these spaces for future generations.

4.2.4. What the key informants said (Site Discussions):

- “Over the years, the surroundings of Lingaraj Temple have grown in a haphazard manner into an amorphous neighbourhood. it is disturbing to note its environmental degradation and decay of several monuments.” – **Prof. K C Behera, Utkal University. A man who has spent over 50 years in the area.**
- “The Lingaraj Temple Vicinity faces a dearth in lighting. Though there are lights on streets but the temple which soars the skyline in the day is not properly visible in the night due to streetlights. This should be corrected” – **Piyush Ranjan Rout, Executive Director, City Managers Association of Orissa.**

4.2.5. Rituals & festivals in Ekamra Kshetra (Mishra, 1989)

The major festivals of Lord Lingaraj are enlisted in Table 4.1:

S.No	Festivals	Descriptions	Duration/Month
1	Sombar veda	Monday festival	Weekly
2	Chaturdasi veda	Fourteenth day festival	Fortnightly
3	Prathamastami	Deity is taken to Mitreswara Temple and Papanasini Tank	Nov - Dec
4	Maghasaptami	Deity is taken to Bhaskareswara Temple and return through Kedar Gouri	Jan - Feb
5	Ashokastami	Deity visit to Rameshwara Temple on a wooden chariot.	Mar - Apr
6	Damanka Chaturdashi	Sub-ordinate deities are taken to Tirtheswara Temple	Mar - Apr
7	Akshya Trutiya (Chandan Jatra)	Sub-ordinate deities are displayed on Bindusagar on a wooden capa.	Apr - May
8	Parsuramastami	Sub-ordinate deities and Lingaraj visit Parasurameswara	Jun - Jul
9	Yama ditiya	Lingaraj visits Yameswara to get rid of Yama	Aug - Sep
10	Pravana sasthi	Rituals by sevaks for Shiv ratri.	Nov - Dec
11	Pusyavisheka	Great bath ritual of the deity in the water of Bindusagar	Dec - Jan
12	Makar Sankranti	Makar rice is presented to deity	Jan - Feb
13	Shiv Ratri	The meeting of Hari and Hara in the inner sanctum of the temple.	Feb - Mar
14	Sayan Chaturdashi	Ceremony in the temple	Jun - Jul
15	Pabitra Ropana	Deity along with others are taken on a visit to the garden	Jul- Aug
16	Uthapana Chaturdashi	Image of Lingaraj is brought out of the temple	Aug - Sep

Bhubaneswar is often hailed as the "Kashi of the East," a title attributed to its profound connection with Lord Shiva (Parashar, Bandopadhyay, 2016). Legend has it that while flying over the region, Shiva and Parvati were overcome by thirst. Unable to find a

water source, Shiva miraculously created the sacred Gosagar or Bindusagar lake. This celestial body is believed to be formed from a single drop of water contributed by every holy water body in India. Lord Brahma consecrated the lake, and Gods Ananta and Vasudeva were appointed as its guardians. Each side of the lake is named distinctly, reflecting its sacred significance. After the Lingaraj temple, Bindusagar is considered the second most important landmark of Ekamra Kshetra (Mishra, 2005).

4.2.6. Religion as a Daily Endeavor

The temple complex at Bhubaneswar functions as the heart of the city, akin to an industrial hub. The community is intrinsically tied to the temple, with their livelihoods and daily routines revolving around its activities. While the temple's operations may seem mundane from an outsider's perspective, they are imbued with deep religious significance. Lord Lingaraj is the focal point, and the rituals performed in his honor form the core of the temple community's existence. This intricate network involves deities, temple staff, their livelihoods, and a complex cycle of daily, weekly, fortnightly, and annual observances (Mishra, 1989). A list of daily rituals is listed in Table 4.2 for information.

Table 4.2: Daily Ritual	
5:00am	Bathing all deities lingam within the compound (more than 100 in number)
7:00-7:30 am	Lamp burning (Akhand)
8:30 am	Brush the teeth of the deity
7:30 – 9:00 am	Cell remains half opened for the public food offering to the deity, i.e., breakfast in earthen pot. In the meantime Suar, the great cook would start cooking in the kitchen after homa.
9:30 am	Great bath of the deity
9:45 – 10:00 am	Surya Puja
11:00 am	Dwarpala Puja
12:30 pm	Breakfast served
1:00 pm	Sakala dhupa of Lingaraj
2:00 pm	Bhoga mandapa food opening
2:30 pm	Birakeswara ballar
3:00 pm	Mid day meal
5:00 pm	Cell closes for Lard to rest.
6:00 pm	Cell reopens for evening Puja
7:00 – 7:30 pm	Open for public
9:00 pm	Food offering
11:00	Food offering

12 midnight	Pushpanjali and temple closed
Traditionally there are 36 different services in the daily rituals round of the deity.	

4.2.7. Geo- political and social Information of Ekamra Kshetra:

Landform & nature:

- 45 meters above Mean Sea Level.
- Geographically, Bhubaneswar is situated in the eastern coastal plains of Orissa and south-west of the Mahanadi River.
- Laterite sub soil region.
- From physiographic point of view, Khurda in South forms part of the North-Eastern hilly tract.
- The extreme south part is occupied by Barunei hill range.

Major rivers (CDP, 2010):

- **Daya** - The river Daya takes off from river Kuakhai at Saradeipur (near Badahati) and runs through emptying itself into the north eastern corner of the chilika lake 37 miles from its take off place.
- **Kuakhai** - River Kuakhai originating as a branch of Mahanadi enters Bhubaneswar block area from the north.

Wetlands, lakes & ponds (CDP,2010):

- Each temple in this part of the city has one or more water tanks nearby.
- Some are quite small while others represent huge expanse of freshwater.
- Lakes in the Ekamra Kshetra are enlisted in Table 4.3.

Table 4.3: List of lakes in Ekamra Kshetra	
Bindusagar	8.84 Hectares
Papanasini Tank	0.20 Hectares
Sukhmeshwar Tank	0.31 Hectares
Nala Kunda	0.19 Hectares
Kedareswara Tank	0.01 Hectares

Location:

- Classified as a Statutory Town – with population mostly working and professionally non-agricultural in nature.
- 20°14'34"N 85°49'56"E, 20°14'00" N 85°50'E to 20°14'15"N 85°50'13"E, 20°14'36"N 85°50'16"E.
- Surrounded by Ratha Danda Road, Lingaraj Road, Hospital Road and Bindusagar Road.
- Ward No. 53 of **Bhubaneswar Municipal Corporation**.

Sunpath	
	December 31
	June 21
	December 21
	Annual variation
	Equinox (March and September)

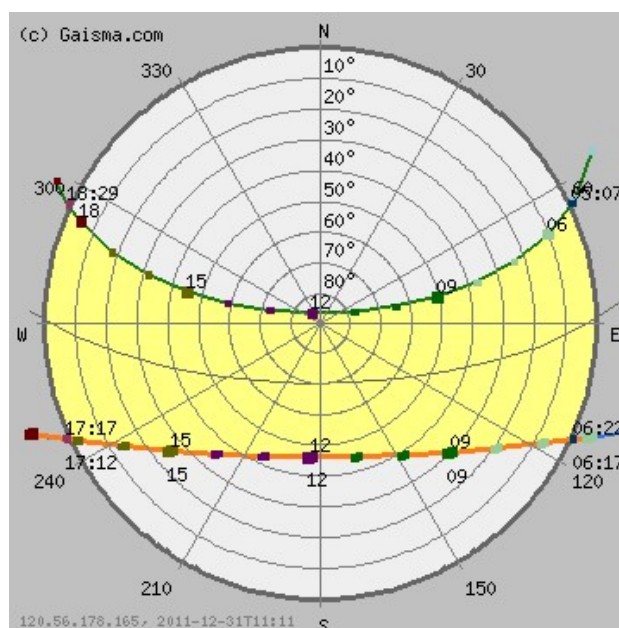


Fig: 4.6 Urban Sunpath Diagram of Bhubaneswar

Table 4.4: Climate of Ekamra Kshetra

Max. temperature	32.93° C
Min. temperature	22.13° C
Average yearly Rainfall	1260.4 mm (in the months of July, August, September)
Wind direction	From SouthWest (prevailing wind) From South and SouthWest (monsoon wind)

Estimated area & population (CDP, 2010):

Ekamra Kshetra experienced a significant population surge between 1991 and 2001, increasing from 23,962 to 62,102 residents. This rapid growth resulted in overcrowded living conditions, particularly in areas like Badadanda Sahi, Nageswar Tangi, and Kapilprasad, with population densities exceeding 100 people per hectare.

Despite this dense population, the area primarily serves as a residential district for the city. This is evident in several key indicators:

- **Predominantly residential:** Approximately 65% of buildings are residential, while commercial and office spaces account for only 2.15% and 0.62% respectively.
- **Affordable housing:** Lower rental costs compared to newer parts of the city attract residents.
- **Commuting workforce:** The majority of employed residents work in other parts of the city, emphasizing the area's residential character.

As per the INTACH Heritage Report 1989, it was observed that around 64.5% of the households are having 4 to 6 members and 5.5 % of the households have more than 8 members. The average household size as worked out from the sampled households is 5.12 (Mishra, 1989).

EKAMRA KSHETRA: The temple city and place of pilgrimage.

Bhubaneswar's evolution into a prominent temple city began around the 5th century AD with the resurgence of Brahminism. Under the patronage of successive royal dynasties, the city centered around the Lingaraj temple gradually developed. A community dedicated to worship and temple management emerged, forming the nucleus of the modern Ekamra Kshetra (Mishra, 2005). This organic growth pattern, typical of many Indian religious centers, resulted in a complex urban structure characterized by distinct traditional enclaves.

As a significant pilgrimage destination since the 8th or 9th century AD, Ekamra Kshetra has thrived due to its proximity to Puri, a revered Hindu pilgrimage site. Countless devotees enroute to Puri often include Bhubaneswar in their itinerary,

drawn by the majestic Lingaraj temple and numerous other shrines. This enduring religious significance ensures that the Lingaraj temple will remain the spiritual heart of the city for both residents and visitors alike.

Land use:

Ekamra Kshetra is currently undergoing rapid residential development due to relatively affordable land prices. Historically, the area's economy revolved around the Lingaraj temple, with commercial activity primarily concentrated on the temple's southern side and a weekly market. However, the emergence of major roads has led to conflicts between commercial enterprises and the temple's ritualistic functions, which remain centered around the Lingaraj complex. There is a pressing need to organize and enhance the informal sector businesses within the area.

Census analysis:

Bhubaneswar, as a rapidly expanding capital, has exerted significant pressure on the older parts of the city. The old town, with its relatively inexpensive land, has become an attractive destination for migrants from the newer areas. This influx is evident in the skewed sex ratio, with a higher proportion of male migrants compared to females.

The area's low cost of living has attracted a predominantly low-income population with lower literacy rates compared to the newer parts of the city. The local economy is primarily driven by the service sector, while agriculture and manufacturing have declined. Traditional household industries are virtually absent.

Social structure:

- **Household Composition and Overcrowding**

The average nuclear family in Ekamra Kshetra consists of six members, leading to significant overcrowding due to the common practice of extended families sharing living spaces. To supplement income, many residents rent out rooms to outsiders given the high cost of living in the newly developed capital city.

- **Economic Shift and Temple Occupation**

Bhubaneswar's transformation into the capital of Orissa has dramatically altered the city's occupational landscape. However, temple-related occupations remain a cornerstone of Ekamra Kshetra's economy.

- Temple-Based Occupation Groups

Households primarily dependent on temple-related work are categorized into 36 distinct occupational groups known as Nigogas.

- Key Roles Within the Temple

Priests hold the most prominent position, responsible for deity worship. Mahasuars, skilled in preparing the sacred food (mahaprasad), occupy the second tier. The Badus, constituting the largest group of temple servants, assist priests in daily rituals.

- Temple Economy and Workforce

The temple's structure accommodates multiple families, each earning a share of the temple's income based on their specific duties. In addition to the Lingaraj temple, individual deities have their own priests. Non-Brahmin personnel fulfill supporting roles such as gardening, pottery, and cleaning.

Over 500 families rely on the temple for their livelihood, deriving income from temple properties. A deep-rooted emotional connection to temple work exists among these families, largely stemming from the financial benefits they have historically received and continue to enjoy. Consequently, many have been reluctant to adopt new professions. While the younger generation has diversified into other occupations, they often retain traditional lifestyles, potentially hindering progressive changes within the community.

In recent years, the mismanagement of temple land has created economic uncertainty for temple workers. To supplement their dwindling income, many have turned to tourism-related activities, sometimes compromising their religious duties.

To enhance temple operations, a comprehensive reform is essential, including the rationalization of temple property management and the regulation of temple worker income.

Economic structure:

For centuries, religion and its associated practices have been the cornerstone of socioeconomic life in this region. Hindu households seamlessly intertwined their economic pursuits with their religious obligations. Just as farming families integrate their lives with agricultural cycles, the local populace integrated temple worship into their daily routines. Until 1948, the entire town functioned as a religious center.

Handicraft Sectors:

- Stone wares i.e. Stone carver.

Odisha is renowned for its exquisite stone carving tradition. Bhubaneswar's artisans continue to produce stunning works of art by shaping sandstone and other hard stones into intricate figures that rival the beauty of ancient temple sculptures. These skilled craftsmen dedicate themselves tirelessly to their craft, working with one of nature's most resilient materials.

- Potters

Historically, a specific area within the city housed potters who supplied the Lingaraj temple with the necessary vessels for prasad preparation and other temple rituals. However, the establishment of the new capital city diverted their focus towards more lucrative opportunities. Consequently, only a handful of potter families remain, and even they have significantly reduced their production or ceased operations altogether. In contrast, the stone carving craft has persisted, with around 5 to 10 families continuing this tradition.

- Filigree Works

Traditionally, textile filigree work was a thriving craft with 10 to 16 families involved. However, the industry has dwindled significantly.

Odisha boasts a rich heritage in handicrafts, including stone carving, pottery, coir products, and filigree work. Currently, these crafts are primarily sold through informal channels. Unfortunately, the number of artisans engaged in these

traditional crafts has drastically reduced, with only a few families continuing the legacy.

To revitalize the handicraft sector, a structured organizational framework is essential. Increased tourism can stimulate demand for these products. Government intervention is crucial to provide infrastructure, financial support, technological advancements, and effective management strategies to empower local artisans and boost the economy.

- Informal Sector

The informal economy plays a significant role in the area, constituting 25% of our study sample. Its activities are deeply intertwined with the Lingaraj temple, including the sale of ritual items like flowers, incense, and prasad. The main square offers various services for tourists, such as food, beverages, and fortune-telling. The sale of prasad at the Anantavasudev temple is a major economic activity.

While many informal sector workers claim to own rural land, the sector's growth is directly linked to the temple's prominence as a pilgrimage and tourist destination. Integrating the informal sector into development plans is crucial. Providing infrastructure and formalizing the sector could be beneficial.

The focus should be on creating a holistic approach that considers the informal sector's role in the temple complex's development and cultural preservation. By organizing shopping areas, offering handicrafts and souvenirs, and improving public amenities, the region can attract more visitors, stimulate the local economy, and enhance the overall experience.

The growth and operation of the informal sector within the temple complex are intrinsically tied to the complex's role as a pilgrimage and tourist hub. Effective urban planning must accommodate and integrate this sector. Formalizing the informal sector might be necessary.

Temple authorities should develop strategies to provide infrastructure for these informal businesses. The key challenge lies not in curtailing the informal sector's

growth but in strategically integrating it into the temple complex's development and cultural preservation.

By organizing shopping areas, offering handicrafts and souvenirs, and enhancing public amenities, the area can attract more visitors, stimulate the local economy, and improve the overall quality of life while preserving its historic character.

4.2.8. Pilgrimage and Tourism:

Bhubaneswar attracts a substantial tourist influx, with an estimated 9-10 million domestic and foreign visitors annually. The city experiences peak visitation during festivals, with daily foot traffic surging from 500 to 25,000. While foreign tourists typically stay for three days, domestic visitors extend their stay to four days, often including Puri and Konark in their itineraries. Tourist arrivals peak between October and March.

Despite being a hub of historical and religious attractions, Bhubaneswar faces challenges in maximizing its tourism potential. While popular sites like Brahmeswara, Mukteswara, Parasurameswara, Vithal Deul, Rajarani, Lingaraj, Kedargouri, and Bindu Sagar are covered by tourist buses, they represent only 10% of the total monuments due to poor accessibility, publicity, and management.

Accommodation options within the old city are limited to Panthanivas, two dharmasalas, and a few small hotels near Kedargouri. The majority of upscale hotels are located outside the historical zone.

Bhubaneswar's strong religious appeal, encompassing Hindu, Buddhist, and Jain sites, drives pilgrimage tourism. However, the city's infrastructure and offerings for leisure and cultural tourism need significant improvement to fully capitalize on its potential.

Tourism, a labor-intensive industry, significantly contributes to economic growth. To maximize its potential, a strategic focus on cultural tourism is imperative for the state's development.

4.2.9. Morphological Analysis:

- Size & shape: The area exhibits an organic, irregular shape, defined by the convergence of Lingaraj Road, Bindusagar Road, and Ratha Danda Road. Its street network is characterized by a haphazard pattern of intersecting roads.
- Street structure: The organic street network evolved in response to the placement of open spaces, temples, and other significant landmarks. Traditionally designed as pedestrian pathways linking key religious sites, these streets now accommodate heavy vehicular traffic.

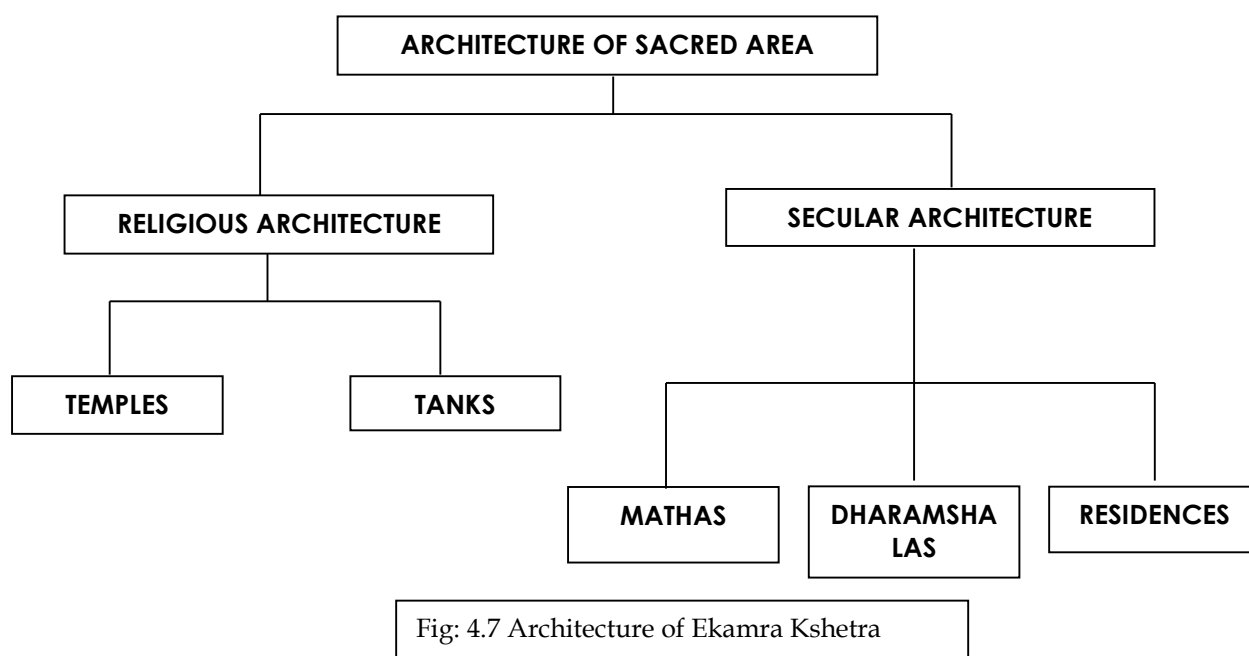
The strategic location of temples and commercial establishments along these streets has transformed them into bustling commercial corridors. However, these spaces were originally conceived for pedestrian-centric activities like religious processions and pilgrimages. The influx of vehicular traffic has disrupted the original intent and character of these streets.

Major Public Street - This is the major North South and East West corridor and the most active vehicular street. These are Ratha Danda and Lingaraj street.

- **Lingaraj Street** - The northern stretch of Lingaraj Temple was historically a predominantly religious thoroughfare lined with significant temples and associated activity. A public square had naturally formed due to the arrangement of these temples and open spaces. However, the area has undergone a dramatic transformation with the encroachment of informal commercial activities, altering the street's character from an organic layout to a linear, commercial corridor. The scale of this change is particularly evident during the annual car festival when the street becomes overwhelmed.
- **Ratha Danda Street** - The street's name is derived from its role as a primary processional route for the annual car festival, which culminates at the Rameswara Temple. Unlike other residential streets, this thoroughfare is significantly wider to accommodate the large-scale chariot procession. Traditionally, the street was lined with single-story thatched houses, fostering a sense of community within the enclosed residential blocks. However, the street's character is evolving with the

construction of multi-story buildings, which while suitable for the street's width, risks obstructing the visual connection to the Lingaraj Temple. The ground floor spaces are increasingly being converted into shops to cater to local residents and commuters.

- **Residential Street** - The area is characterized by a network of narrow streets formed by closely clustered residences. To avoid flooding, houses are typically elevated, with natural drainage channels running along the street level. This intimate scale fosters a strong sense of community, as residents interact closely with passersby from their verandahs, which function as semi-public spaces. Traditional paving materials include a central paved road and unpaved sidewalks to facilitate rainwater percolation. Drainage is managed through open ditches on either side



of the street. However, the recent trend towards taller buildings is altering the street's scale and character.

4.2.10. Building analysis:

There are 3 distinct type of structures within the area having architectural character viz., residences, temples, mathas and dharamshalas (Mishra, 1989).

- Secular Architecture: Mathas, dating back to the 6th century AD, represent the earliest form of Hindu architecture. Initially conceived as shelters for wandering ascetics during the monsoon season, these double-story structures showcase

intricate architectural details. Typically, monasteries followed a clustered layout, with individual cells surrounding a central courtyard. Encased within high, ornate walls, these complexes were self-contained communities. The courtyard served as a communal space for religious and social gatherings, while the individual cells offered privacy and seclusion. Each cell comprises a main shrine chamber and a living area elevated on a platform, characterized by minimal external openings to create a subdued atmosphere conducive to meditation.

- Dharamshala is located in the southeast corner of Bindusagar, this three-story sandstone building originally served as a pilgrim rest house. It comprises 40 rooms arranged around corridors and supported by a sturdy framework of sandstone pillars, wooden, and iron beams. Each floor offers spacious verandahs with balconies, while large arched doors and windows enhance the building's grandeur. Expertly constructed with lime mortar, the structure remains remarkably well-preserved. The building's plan incorporates a central courtyard and features architectural elements such as plinths and parapets.
- Residence A two-story structure with a courtyard layout, this building lacks front and side setbacks. Constructed primarily from laterite, it features an elevated base or plinth.

4.2.11. Ecological aspect (CDP, 2010):

- The Natural and Manmade Environment: Bhubaneswar's historical character is deeply intertwined with its natural environment. The city's organic growth once harmoniously integrated human settlements with the surrounding ecosystem. However, rapid urbanization has disrupted this delicate balance, transforming once-vibrant neighborhoods into congested slums. The challenge lies not merely in restoring individual historic buildings but in reviving the entire ecological system.

Bhubaneswar's initial development respected the local environment, but increasing urbanization has led to ecologically harmful practices.

- Topography and Landform: Morphologically situated on the western edge of Odisha's mid-coastal plain, Bhubaneswar exhibits an average elevation of

approximately 45 meters above mean sea level. In contrast, the older section of the city occupies a lower elevation, below the 30-meter contour. This area is characterized by a gently undulating laterite plateau, sculpted over time by erosional forces into a distinctive valley and ridge topography.

The northeastern and southeastern fringes of the city are traversed by the Kuakhai, Bhargavi, and Daya rivers, tributaries of the Mahanadi. To the north, west, and south, the landscape is punctuated by numerous hills and forested areas. This topographical variation bifurcates the city into a higher western upland region and a lower eastern lowland. The general land slope inclines from west to east and south-southwest, though the eastern riverine areas exhibit a more gradual gradient, ranging from 1:60 to 1:20, creating an almost flat appearance.

The city's geology predominantly comprises Quaternary alluvium and laterite deposits. The latter, a widely used and affordable building material, has been extensively quarried within the old city, resulting in significant ecological challenges.

- Hydrology: Situated at the confluence of the low-lying lateritic foothills of the Eastern Ghats and the coastal alluvial plains, Bhubaneswar has historically grappled with water scarcity. The region's unique geological composition, characterized by high rates of surface runoff and rapid water percolation through the lateritic soil, has resulted in a predominantly dry landscape for most of the year, excluding the monsoon season. These challenging hydrological conditions likely hindered the early development of substantial settlements on the plateau.

While the city currently boasts numerous water bodies, many of these tanks are in advanced stages of eutrophication and require urgent restoration. Notably, some tanks, such as Gauri Kund and Kedar Kund, maintain a perennial water supply, suggesting the presence of underlying natural springs.

- Surface Drainage: The topography of the old town exhibits a gentle westward slope towards the eastern periphery. Due to the predominance of laterite soil in the region, the area possesses an exceptional capacity for water absorption.

Consequently, even after intense monsoon rainfall, the land dries rapidly as rainwater swiftly percolates through the laterite formation. This subterranean water flow ultimately replenishes the local tanks and water bodies, thereby augmenting the region's natural water resources.

However, the construction of the Daya Canal and Puri Road has significantly altered the original westward gradient of the land. These infrastructural interventions have created a physical barrier, disrupting the natural drainage pattern and potentially affecting the groundwater recharge process.

- Sewerage: Bhubaneswar currently lacks a centralized sewerage system. Instead, individual buildings or groups of buildings within specific localities are equipped with underground pipelines that channel wastewater into communal septic tanks. This decentralized approach to sewage management poses significant challenges in terms of public health, environmental sustainability, and urban development.
- Open Space Structure: The spatial composition of the area can be categorized into: water bodies or tanks, incidental spaces, low-lying areas, and large tracts of undeveloped land. These open spaces have historically played a crucial role in maintaining the area's environmental quality. The visual axis connecting these spaces to the Lingaraj Temple's spire is a defining characteristic of the landscape.

4.2.12. Imageability and Urban Guidelines

Imageability is a crucial factor in developing urban guidelines for the Lingaraj Temple and its surroundings. A strong, memorable image enhances a city's appeal and fosters a sense of belonging. Key elements contributing to imageability include paths, landmarks, edges, nodes, and neighbourhoods. A well-structured arrangement of these elements creates a legible and recognizable urban environment.

While imageability is not a panacea for urban problems, its absence often exacerbates them. The study area within Ekamra Kshetra, characterized by historic temples and residential clusters, presents a unique context. Open spaces and low-density areas define the area's mosaic pattern.

The Lingaraj Temple complex serves as a focal point for both locals and visitors, but its multifunctional character, including commercial and transportation activities, has led to an unorganized layout. The primary entry points lack distinctive character. The once clear delineation of eight sacred enclosures has faded, resulting in a fragmented image of the area.

The city's religious heritage, exemplified by the Lingaraj and Ananta Basudeva temples, has drawn significant attention. However, the dominance of these two sites has overshadowed other temples. Ribbon development along roads and the absence of available land have spurred infill development and compromised the area's open spaces.

To address these challenges and create a cohesive urban framework, it is essential to consider the ecological aspects of the area, particularly the flood-prone agricultural lands near water bodies. The existing built form, characterized by compact layouts, high plinths, and traditional architectural elements, offers valuable design cues. Maintaining the clear boundary between the urban core and the surrounding green spaces is crucial for preserving the area's distinct identity.

The goal should be to develop an integrated framework that balances the area's historical, cultural, and environmental values while enhancing its imageability and liveability, considering two important elements that determine the character of the environment: its ecology and its Imageability, the future form of the town understood from the characteristics of the environment.

4.3. Conclusion:

The initial visual survey around the Lingaraj Area in Bhubaneswar, or Ekamra Kshetra, identified critical, interconnected challenges threatening its heritage, environment, and urban functionality:

- **Heritage and Urban Planning Concerns:** The area is suffering from uncontrolled, non-compliant development and encroachments. Many century-old monuments and temples, despite protection efforts by the ASI, are in disrepair. There's a continuous emergence of illegal high-rise buildings exceeding four stories and a

proliferation of slums and squatters being converted into shoddy, unsafe housing with no regard for building bye-laws or open spaces. These modern constructions threaten to obscure the distinctive skyline of ancient temples, eroding the area's historical and cultural identity. Furthermore, commercial encroachments have consumed many heritage buildings and marred the visual appeal of footpaths, obstructing pedestrian movement.

- **Infrastructure, Traffic, and Environmental Issues:** The area is grappling with severe ecological imbalance due to the loss of trees for large-scale urban development. Traffic congestion is rampant due to narrow roads, high volumes of local and tourist traffic (especially buses during festivals), and a significant volume of through-traffic crossing the Lingaraj Temple complex and Bindusagar Lake. This is exacerbated by the absence of designated parking areas. Essential infrastructure is scarce or non-functional: there is no centralized wastewater collection or treatment, insufficient drainage leading to waterlogging and flooding, and the indiscriminate dumping of solid waste pollutes water bodies. Basic amenities like public toilets and information kiosks are scarce, and signage is missing for most temples (apart from Lingaraj and Ananta Basudev), limiting tourist movement and knowledge. Urgent measures, including stricter construction regulations, investment in sustainable infrastructure, and public awareness, are required to improve the overall environment.

The distinctive skyline of Ekamra Kshetra, characterized by ancient temples and traditional architecture, is at risk of being obscured by modern high-rise constructions. This rapid urbanization threatens to erode the area's historical and cultural identity. The absence of essential amenities, such as public toilets and waste disposal facilities, in critical areas has led to the misuse of public spaces. This, in turn, has resulted in the pollution of water bodies and the degradation of the overall environment. The proliferation of commercial establishments along footpaths has marred the visual appeal of Ekamra Kshetra. These encroachments not only obstruct pedestrian movement but also contribute to traffic congestion and noise pollution. To preserve the cultural heritage and ecological balance of Ekamra Kshetra, urgent measures are required to improve the overall environmental quality of the area. This includes

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stricter regulations on construction activities, investment in sustainable infrastructure, and public awareness campaigns to promote responsible behavior.

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5. Urban growth and it's Impact on the morphology in Temple Towns of Odisha – Study of Ekamra Kshetra

5.1. Introduction

The world is experiencing urbanization at a rapid pace, and more than half of the population globally now live in urbanized areas - a significant increase from 1950's one-third, further projected to cross two-third of total population by 2050, according to the 2018 UN Report on Urbanization. This trend necessitates strategic policy coordination and investment to develop sustainable cities that are green, resilient, and inclusive. National and local governments are crucial in shaping this urban future. While population growth and physical expansion of cities are inevitable, it's vital for policymakers and planners to create new guidelines that integrate culture and built heritage. (Cohen, 1999) mentions "Urban planning and conservation should, therefore, be viewed as symbiotic, neither quite complete without the other." This is because historic sites don't just display remains of the past, but they display living connections of shared history and cultural identity, offering valuable insights into the achievements and struggles of our ancestors.

Rapid urbanization, particularly in developing nations like India, poses a significant threat to historic towns renowned for their unique aesthetics, architecture, culture, and historical importance. India has seen a dramatic increase in its urban population, with cities exceeding one million inhabitants rising from 18 in 2001 to 65 in 2024, as per the UN World Urbanization Prospects (UN, 2019). This unchecked growth has led to substantial and often disrespectful alterations to the built cultural heritage of historic and temple towns. Therefore, this survey predominantly aspires to highlight the specific urbanization factors that are causing these changes in the built heritage of *Ekamra Khestra*, a significant temple town in Odisha, India. Key objectives of this survey are to:

- i. Identify key factors affecting alterations in buildings and change in the heritage character of *Ekamra Khestra*

- ii. Investigate the way these factors are responsible for changes in buildings of the selected area of study.

5.2. Background

UNESCO stresses that urban heritage is a valuable asset—socially, culturally, and economically—with reference to Historic Urban Landscape planning. Effective urban planning, therefore, requires a comprehensive path to identifying, conserving, and managing historic areas, taking into account not only physical attributes but also economic and socio-cultural values. However, in rapidly urbanizing Asia, built heritage of historic environments frequently faces a threat of decline. While certain tourism and commercial activities do contribute to the preservation of heritage sites, many Asian nations are still under intense pressure from urban growth and need to actively work to safeguard the distinct identity and continuity of their rich heritage.

India's urban population surged from 100 million to 200 million between 1991 and 2011, a testament to widespread urbanization revealed by the 2011 census. While each Indian town possesses unique characteristics and evolving land-use patterns, unchecked development, coupled with a growing and diverse urban populace, is drastically altering the essence of historic areas. This transformation risks homogenizing the distinct urban fabric of these historical places, making them indistinguishable. Although a handful of cities have started integrating conservation thoughts into their development master plans, the majority of efforts to safeguard heritage and its coherent characteristics in historic areas remain inadequate (PEARL, 2015).

This highlights a crucial need of identifying the factors that impede the preservation of original characteristics in historic buildings. This study of *Ekamra Khestra* aims to examine the urbanization impact on built heritage considering both historical and modern influences. It proposes a conceptual framework to understand these impacts and offers empirical guidelines to prevent unnecessary alterations to heritage buildings in the town's historic areas. Ultimately, the goal is to revitalize the unique heritage character of these urban centers, which has been diminished by the effects of urbanization.

5.3. Framework

Nineteenth-century city planner Patrick Geddes, after analysing Madurai, India's history, strongly advised against demolishing its heritage buildings. Building on Geddes' insights, Giovannoni later advocated for a contemporary architectural style that still harmonized with a historic town's existing built heritage. Preserving historic, aesthetic, architectural and cultural significance of built heritage is predominant in urban planning for both current and future generations. A city's unique character largely hinges on conserving its existing heritage while carefully restraining new architectural elements and public spaces. It's recommended that heritage attributes of structures in historic towns be thoroughly documented to record their characteristics and track changes brought about by modernization. Like many heritage centers, Bhubaneswar too, today face intense pressure of development and urbanization. This has led to an incoherent architectural style and loss of synergetic relationship between old and new structures. (Orbasli, 2008) highlighted that urbanization intimidates both the physical and socio-cultural aspects of heritage towns. (Beatriz and Francisco, 2018) further explored this, examining various physical, historical, economic and socio-cultural factors impacting historic towns. And thus, based on these principles, a study was conducted to assess the intimidation of Bhubaneswar old city.

5.4. Ekamra Kshetra: urbanization and built heritage changes

As discussed in the earlier chapters, the most noteworthy historical place in Bhubaneswar is *Ekamra Kshetra*. It is a renowned temple town celebrated for its historical architecture and rich cultural heritage, legacies of centuries of rule by legendary kings. These rulers significantly shaped the town's landscape through the construction of magnificent religious structures and residences. Until the British colonial era, *Ekamra Kshetra* successfully preserved its distinctive urban fabric and unique stylistic identity. The town's temples display the architectural styles prevalent during the reigns of various kings, while its residential and commercial buildings showcase vernacular and colonial architectural influences, respectively. Even after India's independence in 1947, this urban center managed to achieve a balance between developmental progress and the preservation of its abundant heritage character.

Ekamra Kshetra, a town steeped in history, is increasingly succumbing to urbanization, which is eroding its historical identity. Uncontrolled growth and modernization within its historic core are causing contemporary designs to supplant traditional heritage features. This is leading to irreversible alterations in the physical environment, particularly buildings. As these structures are lost, the town's unique fabric and character risk becoming mere memories, preserved only in a handful of surviving buildings and photographs.

The town's visual elements—including its skyline, building materials, and architectural details—contribute significantly to its intangible value and heritage. However, the pressures of urbanization and development are driving up occupancy rates and land values, prompting changes in building use and modifications to existing structures. This integration of global trends is leading to the loss of the town's distinctive built heritage settings.

Ekamra Kshetra is also known for its multi-generational family businesses. While some shops retain their conventional style, others have been updated to align with current trends. Latest decades have seen a rise in land values, prompting building owners to subdivide their properties and lease them for commercial uses. This has profoundly impacted the town's streetscapes and skylines. To safeguard *Ekamra Kshetra's* significant built heritage, it is imperative to identify the factors driving these changes and implement measures to balance urban growth with the preservation of its historical settings. A casual disregard for the potential adverse effects of new urban interventions poses a serious threat to the existing urban fabric.

In the subsequent sections, an empirical model for urbanization will be established. This model will define the variables which carry significant potential to reshape the built heritage of *Ekamra Kshetra*, enabling a more informed approach to conservation.

5.5. The study area

Ekamra Kshetra, a historic town in Odisha, India, serves as the study area. This town encompasses several municipal administrative wards and numerous streets, covering an area of 4.55 square kilometers. A significant 70% of its land is utilized for residential

and commercial purposes. Within its municipal administrative area, *Ekamra Kshetra* boasts over 100 temples, varying in size. The emperors of *Ekamra Kshetra* developed a distinctive architectural style for both its temples and urban landscape, contributing to the town's divine and magnificent character, evident in its temples and sacred water tanks. Consequently, it has evolved into a historically significant native settlement.

The study specifically focuses on several streets located within *Ekamra Kshetra*'s historic center. These streets feature numerous structures such as sacred water tanks, and important temples, including the religiously significant Sahasralinga Tank (as shown in Fig. 5.1). During festivals, a processional route connects the key temples with these sacred water tanks. Lewis Road, the major city road traversing this part of town, also functions as its primary commercial corridor. This has led to the majority of land-use changes and development occurring along this road. Crucially, the selected study area contains several heritage specimens highly vulnerable to disruption due to modern development.

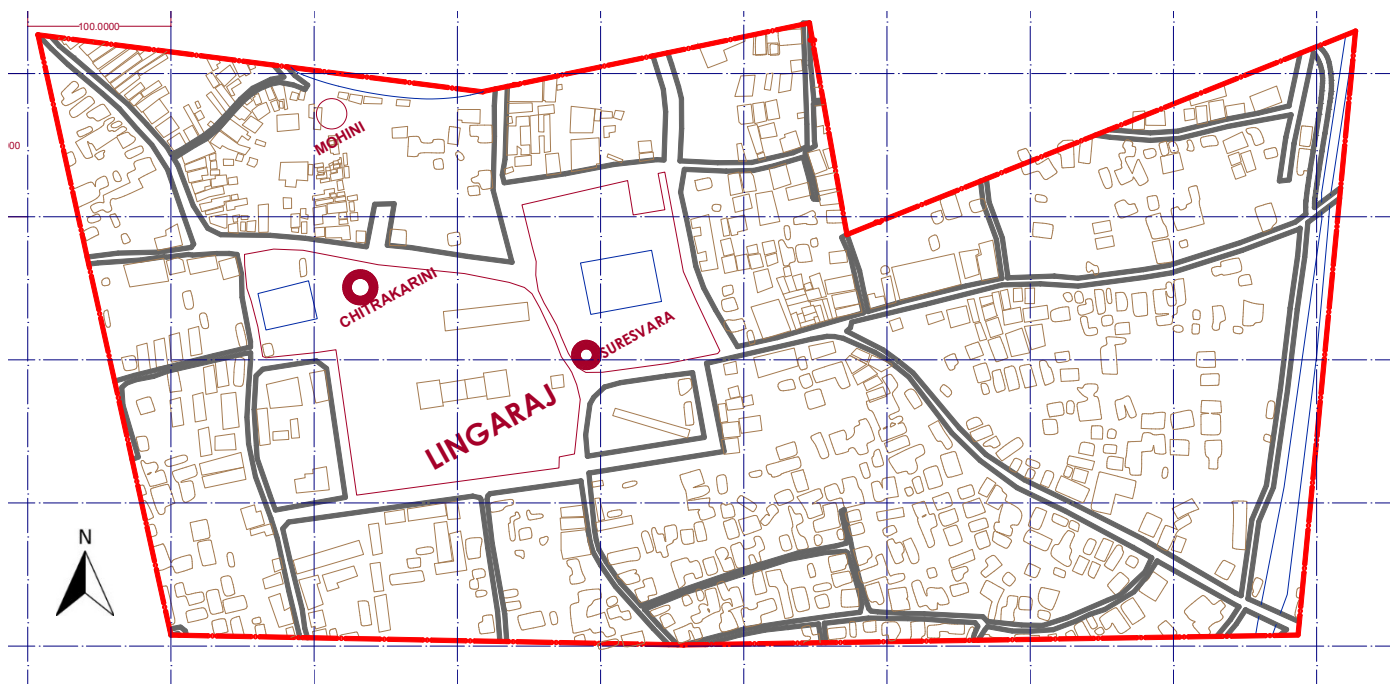


Fig 5.1 : Map of the area selected for Survey.

Source: Author

To thoroughly examine the impact of urbanization in *Ekamra Kshetra*, an area measuring approximately 324,837 square meters was chosen for detailed physical,

social, and morphological analysis, alongside an assessment based on various urban design guidelines. The boundaries of this survey area are defined by major access roads, and its selection was based on the Bhubaneswar CDP map, Municipal map, and Google imagery.

The selected area includes the noteworthy temples of Lingaraj, Chitrakarini, Suresvara, and Mohini. This particular selection ensures the inclusion of temples protected by both the Archaeological Survey of India (ASI) and the State Department of Archaeology - Lingaraj and Chitrakarini protected by the ASI, and Suresvara, Mohini listed with the State Archaeology. Within this chosen area, the Lingaraj and Chitrakarini temples cover 26,618 square meters, the Suresvara temple and its tank occupy 12,336 square meters, and the Mohini temple spans 354 square meters. Additionally, approach roads and pathways account for a total of 33,716 square meters.

Following the selection of the area for survey, a key performance indicator was enlisted. This consists of the following parameters:

1. Height of the building.
2. Existing treatment of the façade.
3. Category of the building.
4. Material used for construction.
5. Construction technology used (Framed or Load bearing structure)
6. Footprint of the structure.
7. Tentative year of construction.
8. Floor to floor height as visible.
9. Approximate size of the plot.
10. Aspect ratio of the building (front width: side depth)
11. Any other significant observation.

Based on the above parameters, a detailed, house-to-house visual study was conducted over three months. This involved visiting every street and examining over 500 structures, with their details meticulously marked and numbered on a map.

5.6. Outcome of Visual Survey

As per the visual survey undertaken to determine the nature and morphology of the settlement, the following have been the outcomes:

A. Technology Used (Ref: Fig. 5.2): Most of the houses are modern RCC structures, while the remaining are mostly load bearing structures clearly indicating development in the last 30 years.

Almost all the structures in this area are built using modern construction techniques and technologies. All of them have the use of cement – with majorly being RCC framed structures or load bearing structures, indicating that these

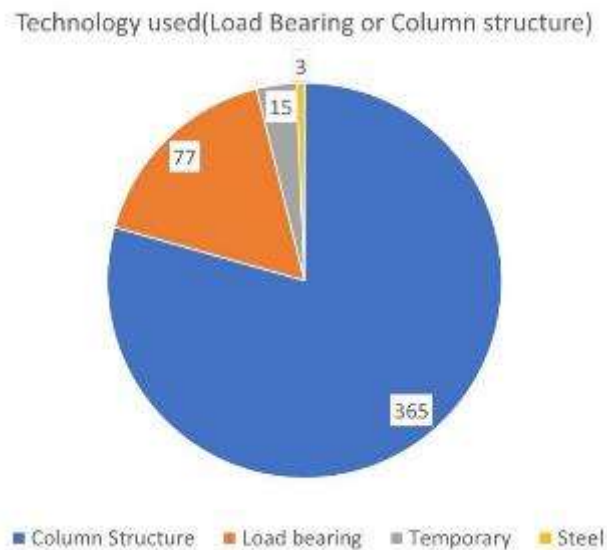


Fig 5.2: Technology Used; Source: Author

have been built in the last part of the 20th century or later. This clearly indicates that these structures have either been built on open lands which were initially used for agricultural or grazing purposes as was practice till the mid of the 20th century; or they have been built after razing the old houses which owing to their traditional construction techniques such as mud walls, terracotta tiled or grass roof were damaged or did not have the future potential for expansion.

While older residences in the area still retain their customary character, those constructed within the last two decades are predominantly RCC (Reinforced Cement Concrete) structures, lacking conventional materials and character on their facades. The most recent and upcoming buildings further emphasize this trend, utilizing modern materials exclusively. This lack of traditional aesthetic in newer facades clearly indicates an absence of regulations governing the use of conventional building materials within this heritage precinct. Urgent action is needed to implement such regulations to foster a more cohesive and homogenous building character in the area.

B. Building Height (Ref: Fig. 5.3): The area selected has a majority of G+1 or G+2 structures, indicating these are meant for personal use. There are also significant single storeyed structures, and also a group of G+3 storeyed structures in the vicinity. One important aspect to be noted is that there literally no multi-storeyed structures above G+10 storey levels clearly indicating presence of some height restrictions in the area to respect the historic structures.

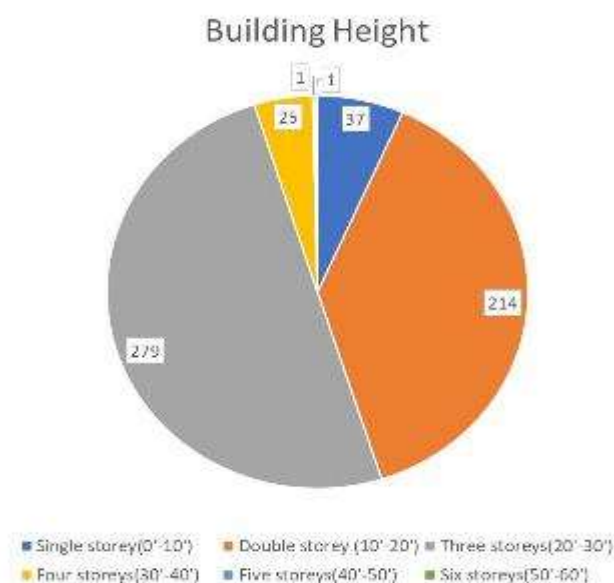


Fig 5.3: Building Height; Source: Author

This again indicates recent development. As informed earlier, this is in tandem with the ground floor being used as shop or commercial establishment and upper floors being used as residences. Structures higher than G+2 are mostly group housing societies.

Most buildings in the area are limited to G+1 or G+2 stories, with no structures exceeding six stories, suggesting existing height restrictions. However, considering the street width, buildings ideally shouldn't exceed G+2. Recently constructed buildings, in contrast, have maximized their Floor Area Ratio (FAR) to reach G+5, thereby disrupting the distinct skyline of the heritage structures. This indicates a clear need for more stringent building height regulations to be implemented for this heritage area.

C. Façade Treatment (Ref: Fig. 5.4): The façade is mostly finished with cement plaster, be it a RCC structure or a load bearing structure. Other façade treatment such as cement plaster with clay tiled roof, stones etc are also marginally seen in the area along with some temporary structures.

The surveyed buildings in the area are predominantly modern structures that show little to no regard for the nearby heritage buildings, consequently featuring contemporary facades entirely lacking homogeneity.

Furthermore, there's an apparent absence of specialized building norms or a dedicated

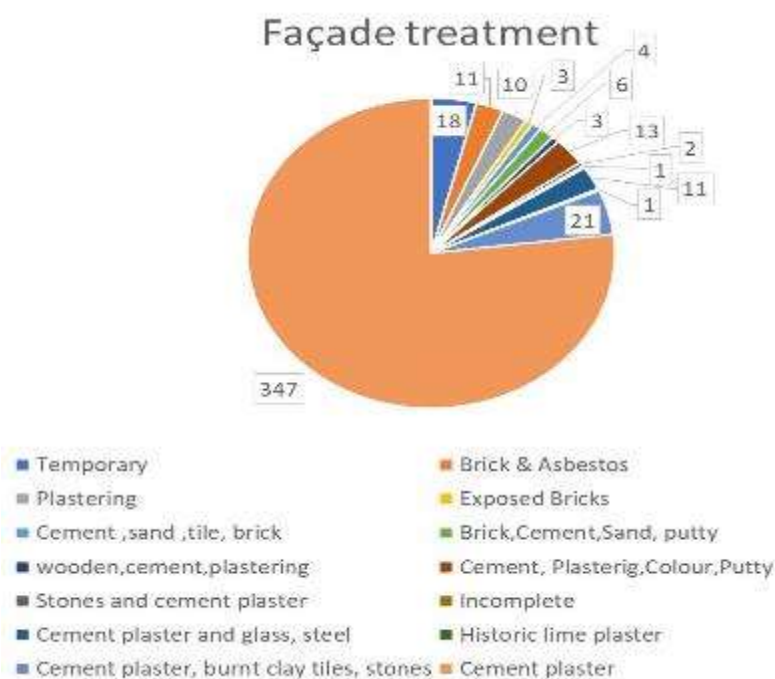


Fig 5.4: Façade Treatment; Source: Author

agency, similar to the Delhi Urban Arts Commission (DUAC), that could regulate facades and external appearance of buildings to foster spatial homogeneity while simultaneously respecting the area's rich heritage.

Recent construction in the area features entirely modern facades, using contemporary materials and treatments, completely lacking the traditional character. To create a homogeneous aesthetic within this heritage zone, strict building regulations on facade treatments are urgently required.

D. Building footprint (Ref: Fig. 5.5): The area surveyed consists of a range of building footprint. However, most of the buildings fall within the 100 – 200 sqm range typically comprising of G+1 structures which are prominent in the area. There are also smaller sized buildings within 10 – 100 sqm range which are also prominent in the area.

Most of the structures built in the area fall in the 100 – 200 square metres plot size. This clearly indicates that these plots have been later developed into smaller sizes. As discussed earlier, the land in this area must have been agricultural or grazing

land originally even during the formation of the new capital of Bhubaneswar, respecting the heritage and not allowing construction in close vicinity. However, with urban population explosion, authorities under several thoughts from the governments have succumbed. The land use may have been changed in late 20th century following which these plots sizes were developed.

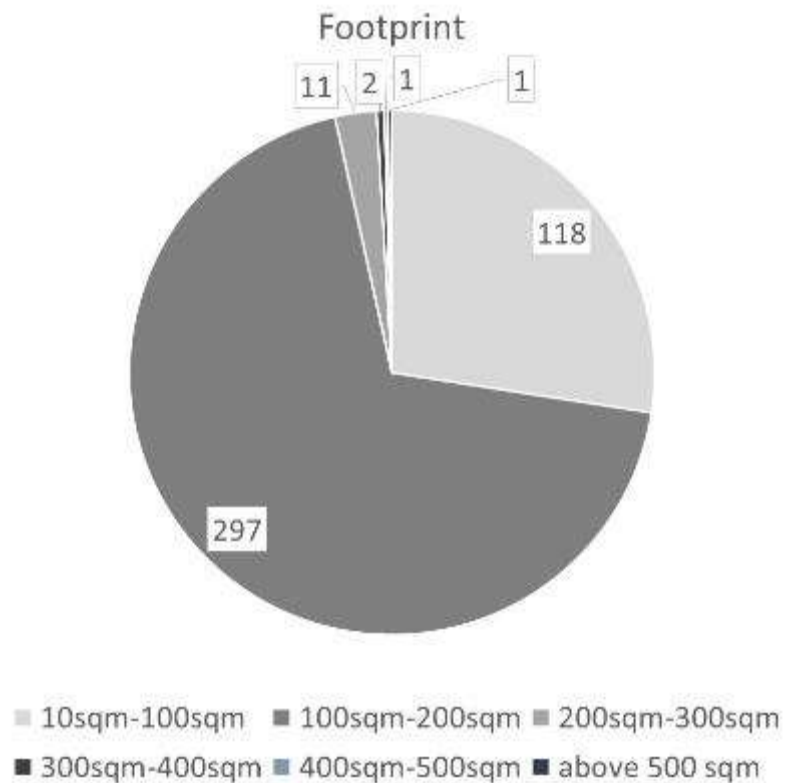


Fig 5.5: Footprint; Source: Author

While older buildings have smaller footprints, newer and upcoming developments are characterized by significantly larger footprints. There is currently a lack of guidelines concerning plot amalgamation in the area, which has led developers to combine plots for high-rise constructions. These larger footprints result in colossal developments that disrupt the heritage precinct's skyline and break the homogeneity of the urban fabric, particularly along the streets leading to the temples. To preserve the urban aesthetics, strict guidelines regarding allowable building footprints must be implemented.

- E. Nature of Building (Ref: Fig. 5.6): Majority of the buildings are either commercial or residential cum commercial. This can be majorly attributed to the locality and the influx of tourists to the place.

As evident from the survey, the selected area has a mixed land use with the majority of the area being used as commercial areas with a mixed use as residential. Landlords in these areas have tapped the opportunity of commercial establishments owing to the religious nature of the place which draws several

tourists from various parts of the country. With daily affairs of pujas and other significant rituals, the shops have sustained business. To add to their commercial aspects, the structures mostly have shops on the ground floor facing the streets with access

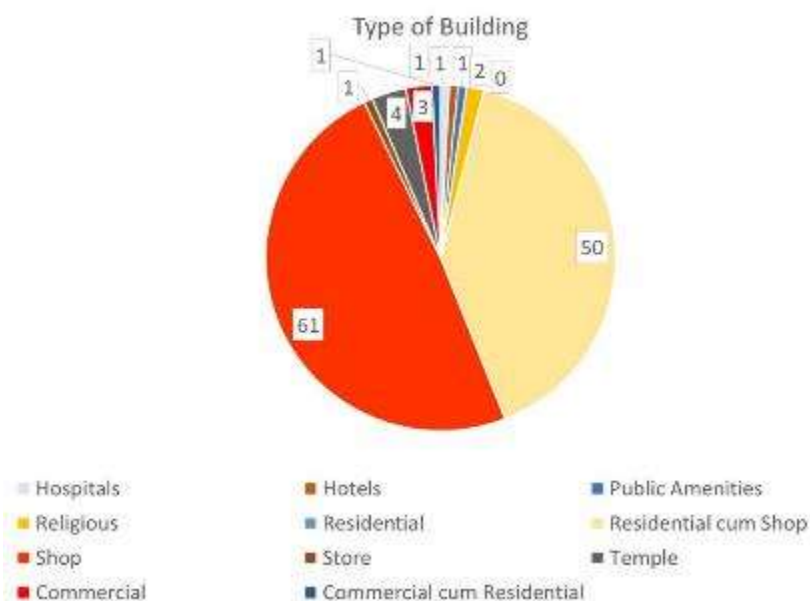


Fig 5.6: Type of Building; Source: Author

to the first floor being used as residences – for self-occupation or/ and renting out on both long term or short term basis. There are also a few clusters of housing societies which have developed recently. Houses mostly fall in the lower and upper middle-class categories. There are also some public structures such as health centre, Kalyan Mandap, shop complex, public convenience, etc.

Older houses in the area are typically mixed-use, while recent developments are predominantly commercial. Given that mixed-use buildings, combining commercial and residential functions, contribute to a more vibrant street character and public realm, making mixed-use mandatory through the implementation of a Local Development Plan could be beneficial.

- F. Year of construction (Ref: Fig. 5.7): As per the survey, most of houses were built in the 21st century while almost equal number of houses were built in the late 20th century. This can be determined by their nature of construction. Ironically, the age of a group of buildings can't be determined due to their nature and style of construction.

Of the 476 structures surveyed, 80% of the buildings are built in the later part of the 20th century. On further analysis, it can be adjudicated that the structures are built after the late 1990s when the population surge eventualised in Bhubaneswar with many people from the rural areas moving to the urban areas. Also, in this

period, expansion plans of the Bhubaneswar Urban Area were envisaged to engulf into the nearby villages. As with the trend everywhere, this area too eventually developed into thick urban residential forests.

Within the last decade, the majority of older houses in this heritage precinct have

been rebuilt or reconstructed using modern materials and techniques. This rapid transformation of the built environment directly impacts the visual character of the area. Therefore, strict building bye-laws for all future developments are urgently needed.

G. Material used (Ref: Fig. 5.8):

The buildings surveyed have used cement, brick and plastered over clearly indicating that these structures were built only in the later part of 20th century or later.

This clearly indicates that these structures have either been built recently or they

have been built after razing the old houses which owing to their traditional construction techniques such as mud walls, terracotta tiled or grass roof were damaged or did not have the future potential for expansion. There is a need for greater acceptance and implementation of heritage bye laws respecting the sanctity of the place.

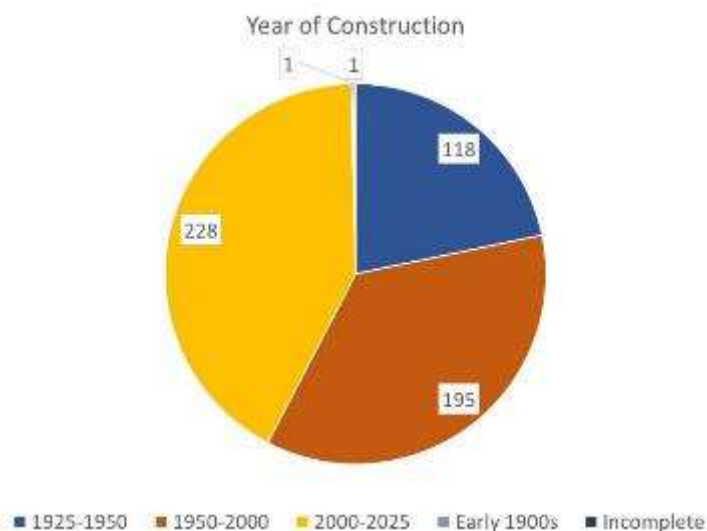


Fig 5.7: Year of Construction; Source: Author

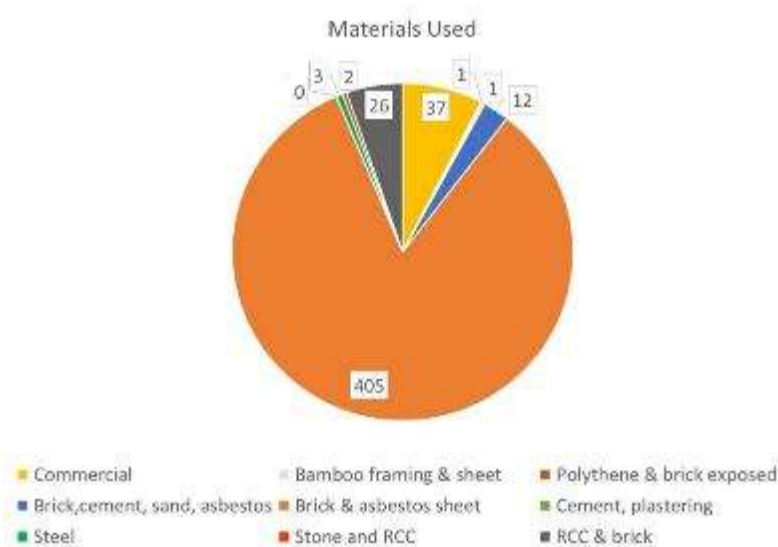


Fig 5.8: Materials Used; Source: Author

The use of modern materials for facades in newly constructed buildings is directly eroding the traditional, heritage character of the area. To preserve this character, a regulated list of permissible materials, at least for building facades, should be established and enforced.

H. Floor to Floor height (Ref: Fig. 5.9): As clearly indicated in the survey, the structures being mostly either commercial or residential have a floor height of upto 10' which has been a standard practice since the 1970s in this part of the world.

As inferred earlier, these structures have been built in the later part of the 20th century, with little respect to the surrounding, creating confused imageability in the area.

There is no specific guideline regarding floor to floor height in the area. While the older buildings maintain a height up to 10', the newer buildings create lesser floor to floor height.

Sometimes, the newly built commercial buildings create a double height upto 18'. This unevenness in floor to floor height directly impacts the street character. The visual lines of the streetscape are hampered due to such unevenness in floor to floor height. To create a homogeneous street character, strict guidelines need to be implemented in this regard.

I. Building aspect ratio (Ref: Fig. 5.10): Most of the buildings in the area have smaller frontage as compared to the depth of the building indicating that these have been eventually fragmented into smaller parts.

There are hardly any offsets to most of the buildings clearly indicating that there has been no pre-approval of building byelaws which have been violated. There is a need to respect the local bye laws and structures developed accordingly.

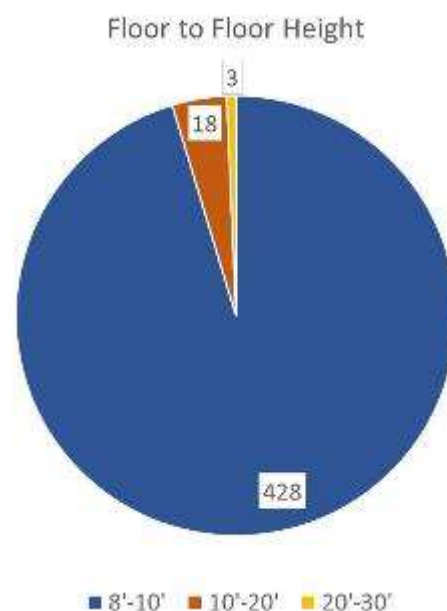


Fig 5.9: Floor to Floor Height; Source: Author

While the older houses have greater depth compared to smaller frontage, the new buildings have a wide frontage. This adversely impacts the character of the street with respect to homogeneity. Design guidelines should be in place for façade length to maintain homogeneous street character in similar heritage precinct.

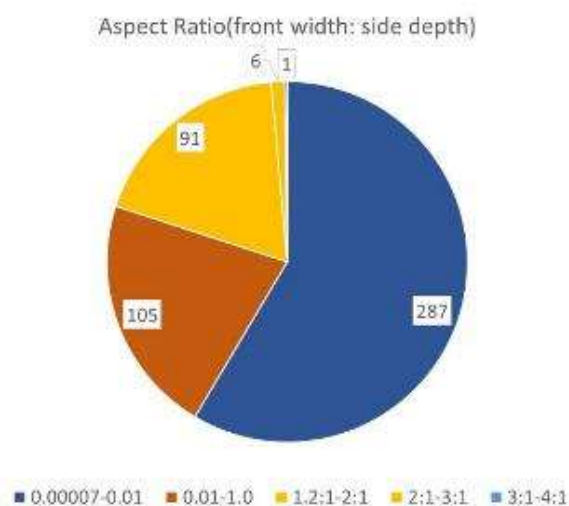


Fig 5.10: Aspect Ratio; Source: Author

- J. Plot size (Ref: Fig. 5.11): The plots in the area fall majorly within the 1000 – 3000 sqft bracket. Sizes within 100 – 1000 sqft make the next significant bracket. There are also a sizeable number of plots larger than 5000 sqft in the surveyed area. This clearly indicates that these plots have been later developed into smaller sizes. As discussed earlier, the land in this area must have been agricultural or grazing land originally even during the formation of the new capital of Bhubaneswar, respecting the heritage and not allowing construction in close vicinity. However, with urban population explosion, authorities under several thoughts from the governments have succumbed. The land use may have been changed in late 20th century following which these plots sizes were developed.

As already discussed, the older houses are built on small plots, whereas the recently built houses are products of plot coalesce and built over larger plots. This also creates a contrasting built environment, not suitable as per the sustainable urban principles.

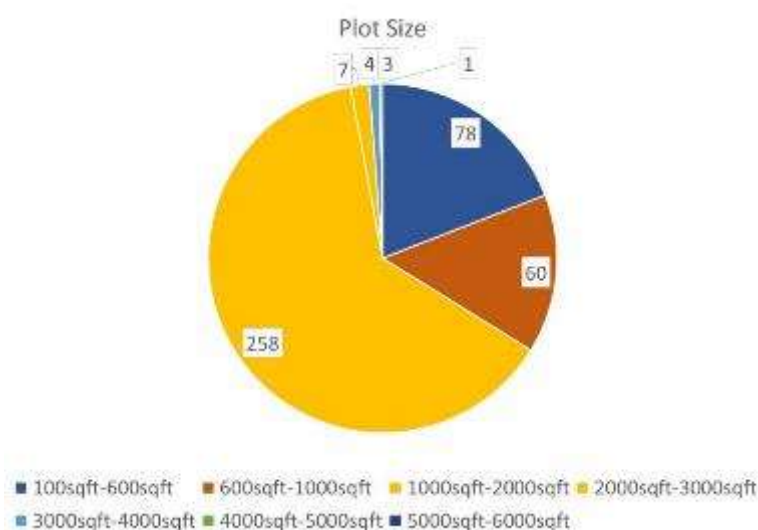


Fig 5.11: Plot Size; Source: Author

Comparative Analysis of Ahmedabad and Bhubaneswar based on the findings and literature study:

- The oldest structure of the Ahmedabad walled city is *Bhadra Fort* – a 15th century structure, while *Ekamra Kshetra* propagated from 11th century with the establishment of Lingaraj Temple.
- Both the historic places have over the centuries been subject to significant transformations – congestions and encroachments.
- Both the historic places have been packed with informal markets and bazaars – commercial places and sprawling housing in the vicinity.
- There is a lack of any formal or informal guidelines for development in this area.
- Both the places have lost their visual character due to the intense commercial activities.

With many similarities in both the places, the strategies suggested for revitalization of the historic core of Ahmedabad can also be referred for the development of a Heritage Plan of *Ekamra Kshetra*.

5.7. Conclusion:

This survey included rapid visual survey of over 470 structures which included residential units, commercial units and public spaces. After completing a detailed visual survey of over 80 acres in the populous area encompassing the significant temples of Lingaraj, Chitrakarini, Mohini, and Suresvara, the collected data was meticulously reviewed and analyzed. This process aimed to identify and highlight the critical issues that require immediate attention. Detailed pictorial analysis was carried out with respect to the nature of the structure, built of the structure, finishing, plot size, carbon footprint and building height.

The findings highlighted the presence of a mixed land use of commercial and residential purpose, which seems to have been developed recently, adversely affecting the heritage character of *Ekamra Kshetra*. Structures in this area are built using modern construction techniques and technologies. All of them have the use of cement –

majorly being RCC framed structures or load bearing structures, indicating that these have been built in the last part of the 20th century or later, as against the traditional construction techniques.

One of the reasons for this adverse development is lack of thought and population surge beyond control, personal benefits. One relief is the absence high rise structures which is possibly due to height restrictions as per setbacks which have been a part of the urban area building bye-laws. Lower buying capacity could also be another reason. Modern buildings in the area are constructed with little regard for the nearby heritage structures, utilizing contemporary facades that lack any sense of homogeneity. This design approach actively degrades the inherent nature of the space, which is primarily a sacred and pilgrimage-focused environment.

5.8. References:

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6. Urban growth and its Impact on the morphological characterization of Temple Towns in Odisha – Response from Users and Experts

6.1. Introduction

Historic towns often exhibit a rich mixture of social, cultural, architectural, and historical heritage values (Cohen, 1999). Urbanization is causing the neglect of heritage while accommodating stakeholders' demands in developing streetscapes, urban fabrics, and buildings. Stakeholders need to preserve the distinct character and quality of the historic environment for the benefit of future generations. The development of towns and cities is not inherently destructive. However, when growth is haphazard, modernization is uncontrolled, planning is poor, and heritage values are not taken into account, a range of problems can arise. These problems threaten both the tangible and intangible aspects of heritage. A culture based approach to urban heritage management integrates intangible heritage, festivals, museums, and creative industries to benefit communities and ensure compatible use and conservation (UNESCO Historic Urban Landscape, 2011)

6.2. Background

During the 20th century, many cities rejected traditional architecture and building techniques in favour of modern methods. Commercial establishments moving into the settlement core pushed for new architectural interventions, expecting historic buildings to sacrifice their heritage values. Replacing old buildings with new construction erases the social and cultural identity of a city and its inhabitants. (BM Pozas, 2018) argued that Urban planning in historic cities should consider social, cultural, economic, and historical contexts.

Following the selection of the area for survey, a detailed visual survey was conducted for over 500 houses on the basis of height of the building, existing treatment of the façade, category of the building, material used for construction, construction technology used (Framed or Load bearing structure), footprint of the structure,

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tentative year of construction, floor to floor height as visible, approximate size of the plot, aspect ratio of the building (front width : side depth) etc.

To further substantiate the study, it was critical to receive significant inputs from some of the users to corroborate the findings and analyse them thereafter. It was decided that the users of the area will be divided into various groups based on work, age, years of stay and use of the area. To get a holistic review of the selected area, it was agreed that these questionnaires will be divided into two groups viz., subject matter experts and end users. Following the receipt of answers from both, the findings were compiled to derive the results.

The questionnaire was prepared based on the following criteria:

1. Identification of the category of the people residing or using the given space. This included both the residents, tourists and other kind of users.
2. User and experts' perception of the development pattern and public infrastructure.
3. Users' perception of the spatial characteristics of the location.

A sample questionnaire is attached in Annexure B.

6.3. Outcomes of User, Expert Reviews

6.3.1. Introduction

As informed, to ensure the authenticity of the survey and ensure correctness, the two-pronged survey consisted of rapid visual survey of a selected area and on field discussions with users and field, subject matter experts.

On field survey included morphological analysis of the selected area, its pattern of development, age of the building, use of materials for construction, total height of the building, number of floors and proportion of the frontage to side along with the total footprint of the building.

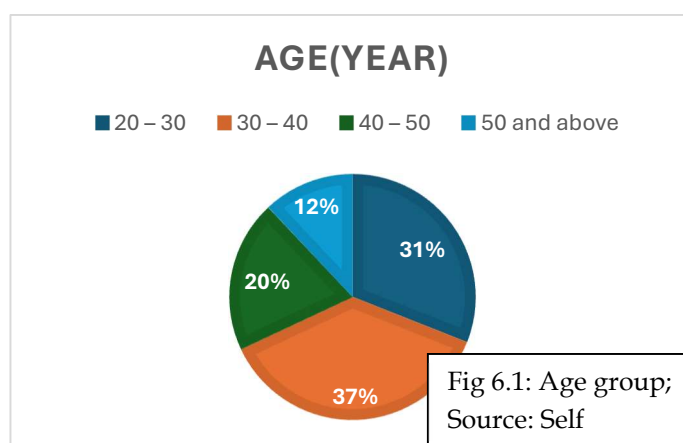
The discussion with users and field, subject matter experts included their classification based on age, education, years of stay in the area, developments they have seen in the

last three decades, current status of various parameters such as urban infrastructure, imageability and other aspects of urban design guidelines.

Following the receipt of the responses from users and field experts, and compilation of the visual survey, pie charts and bar charts were prepared to analyse the data collected. The following were the outcome of the analysis of the surveys

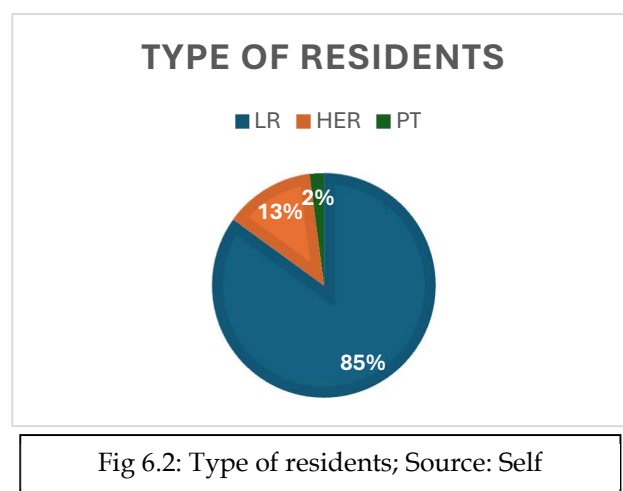
6.3.2 Classification of Users

A. *Age group (Ref: Fig 6.1):* Of the users and experts, 31% were in the 20 – 30 years range, the 30-40 years range formed the larger share of 37%, while 40 – 50 years and 50 years and above respondents formed a share of 20% and 12% respectively. Due to



shy nature and looming fear of chances of being evicted, the senior age group was not comfortable to respond and thus this age group is the lowest.

B. *Type of residents (Ref: Fig 6.2):* Of the people surveyed, 85% were local residents while the remaining 13% were heritage professionals, experts. Remaining 2% were pilgrims or tourists who were visiting the place. With the maximum number of locals interviewed, there is high probability of correct information further testified by the heritage professionals. At the same time, some light is also shed on the issues by the tourists making the survey holistic.



C. *Gender and marital status (Ref: Fig 6.3, 6.4):* 66% of the people surveyed were male while 34% were female. 70% were married while 30% were unmarried.

Considering the establishment and set up of the place, this provides a adequate range amongst genders and marital status to derive a suitable result.

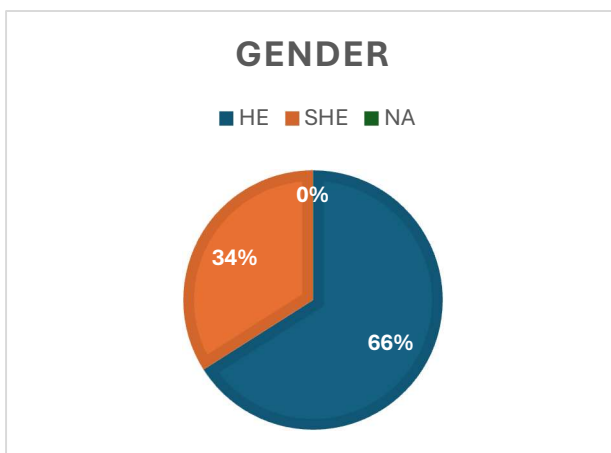


Fig 6.3; Source: Self

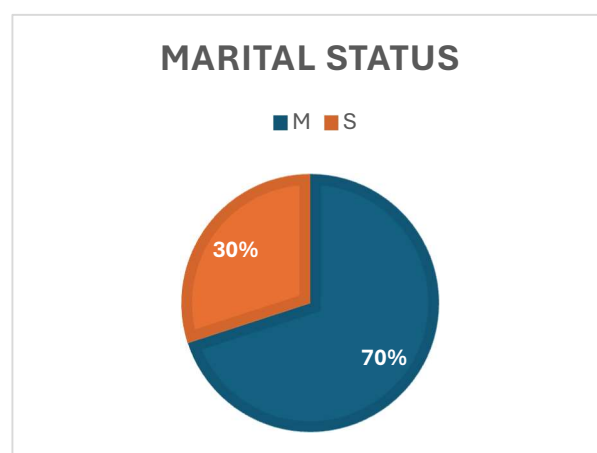


Fig 6.4: Marital Status; Source: Self

D. *Ownership* (Ref: Fig 6.5): In the area identified and surveyed, around 90% are house owners while 10% are in rented accommodation. This indicates that most of the respondents have been associated with this place for reasonable time and would be interested in genuine development of the area for their own betterment.

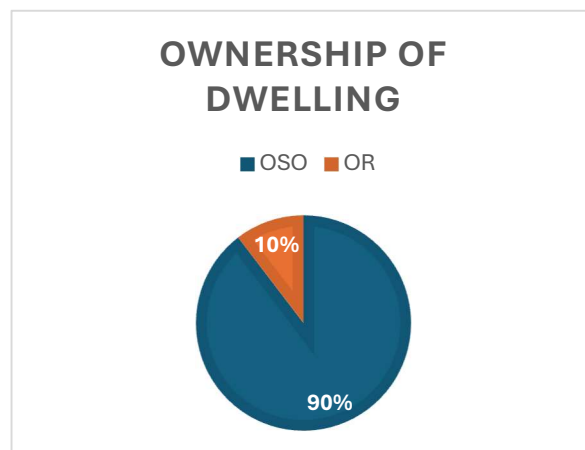
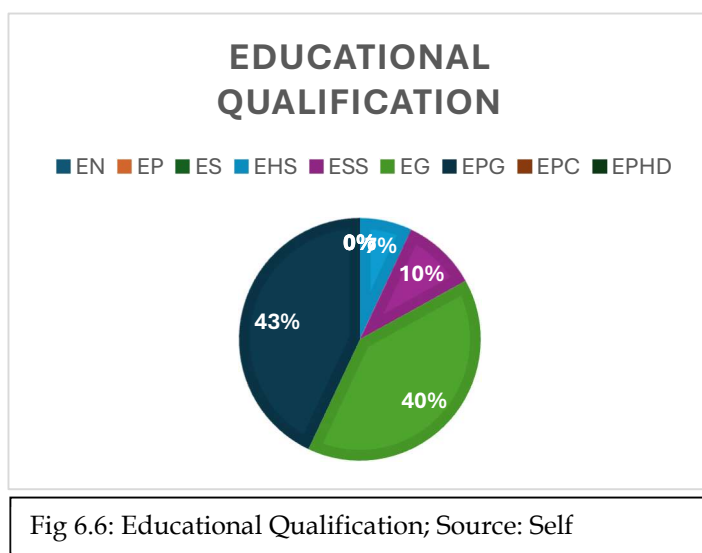


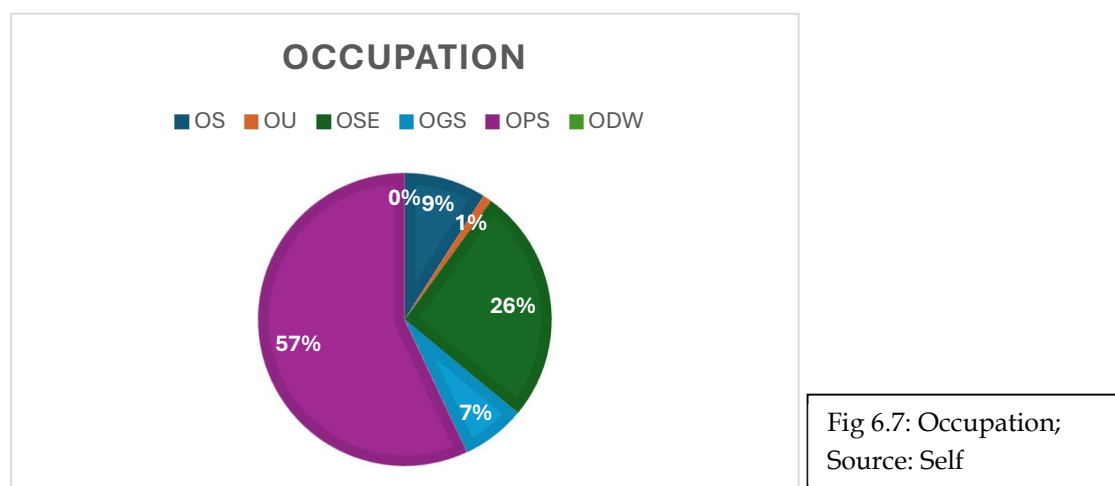
Fig 6.5: Ownership of Dwelling; Source: Self

E. *Educational Qualification* (Ref: Fig 6.6):

The respondents are majorly qualified enough to review the surroundings and provide appropriate answers to the questionnaire. While 43% are post graduates, 40% are graduates, 10% have passed secondary school and 7% have only passed high school. The respondents strata confirms to a well informed respondent who are beneficial.



F. *Occupation* (Ref: Fig 6.7): Most of the respondents are largely employed in private services, with significant respondents being self-employed in the vicinity.



G. *Monthly income* (Ref: Fig. 6.8): As seen in the reference figure, major of the respondents fall under the 10000 to 50000 monthly income bracket, indicating a mediocre lifestyle and capacity in the locality.

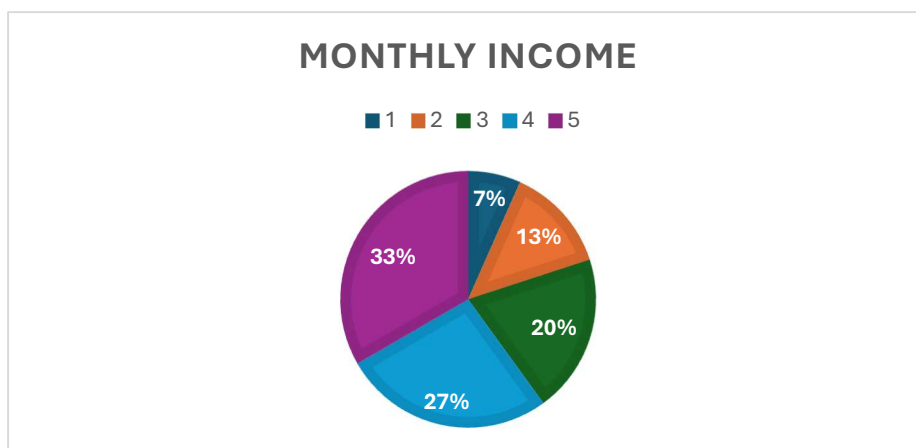


Fig 6.8: Monthly Income; Source: Self

H. *Years of stay* (Ref: Fig. 6.9): Majorly, the respondents have spent 20 to 30 years in this area. So, they have a well developed thought of the area, with the identified issues and are beneficial for the correct assessment of the project.

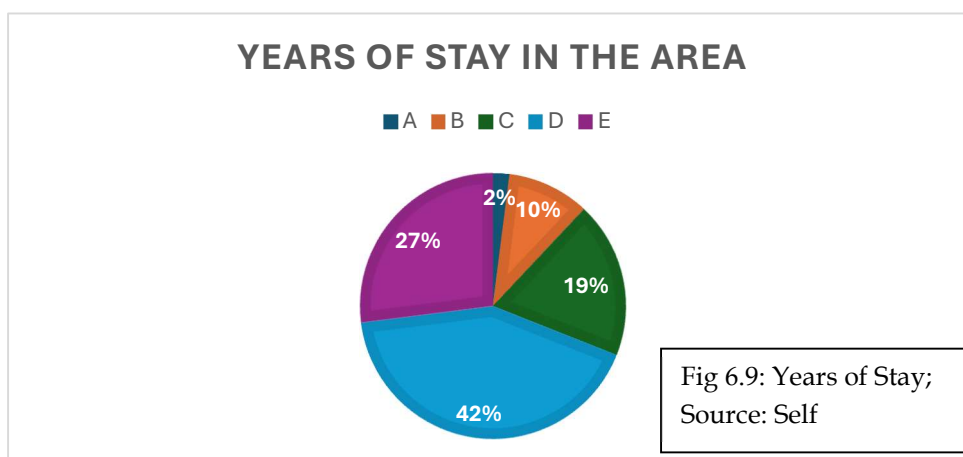


Fig 6.9: Years of Stay; Source: Self

- I. Purpose of residence (Ref: Fig. 6.10): As indicated in the figure, majority of the respondents live here due to the low cost of living.

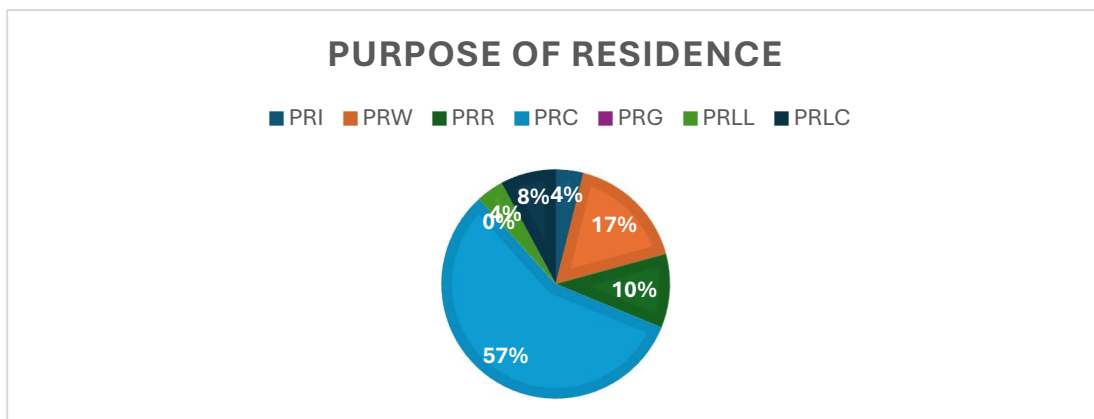
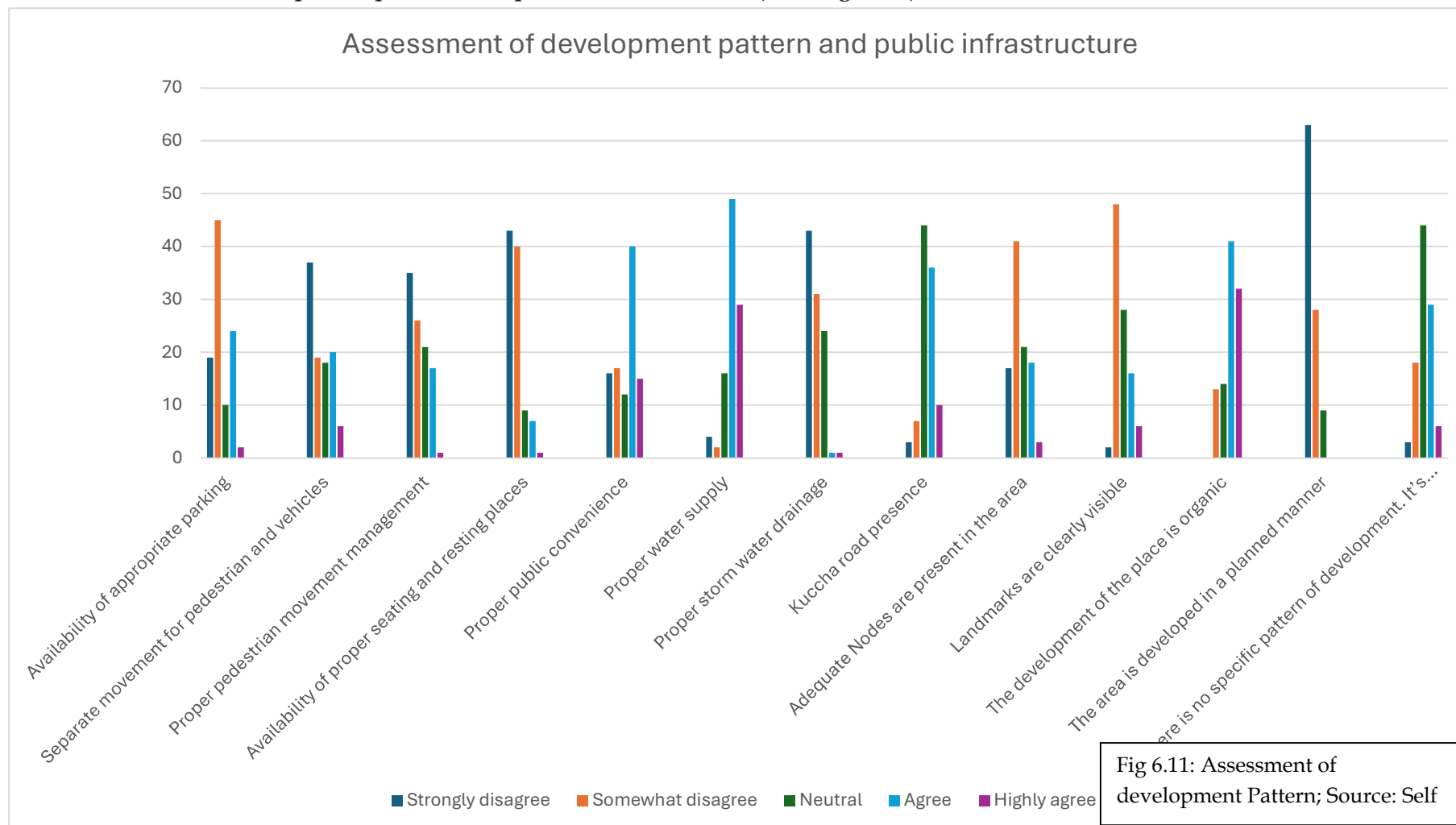


Fig 6.10: Purpose of Residence; Source: Self

6.3.3 Responses from Users, residents and Subject experts

A. Assessment of development pattern and public infrastructure (Ref: Fig. 6.11):

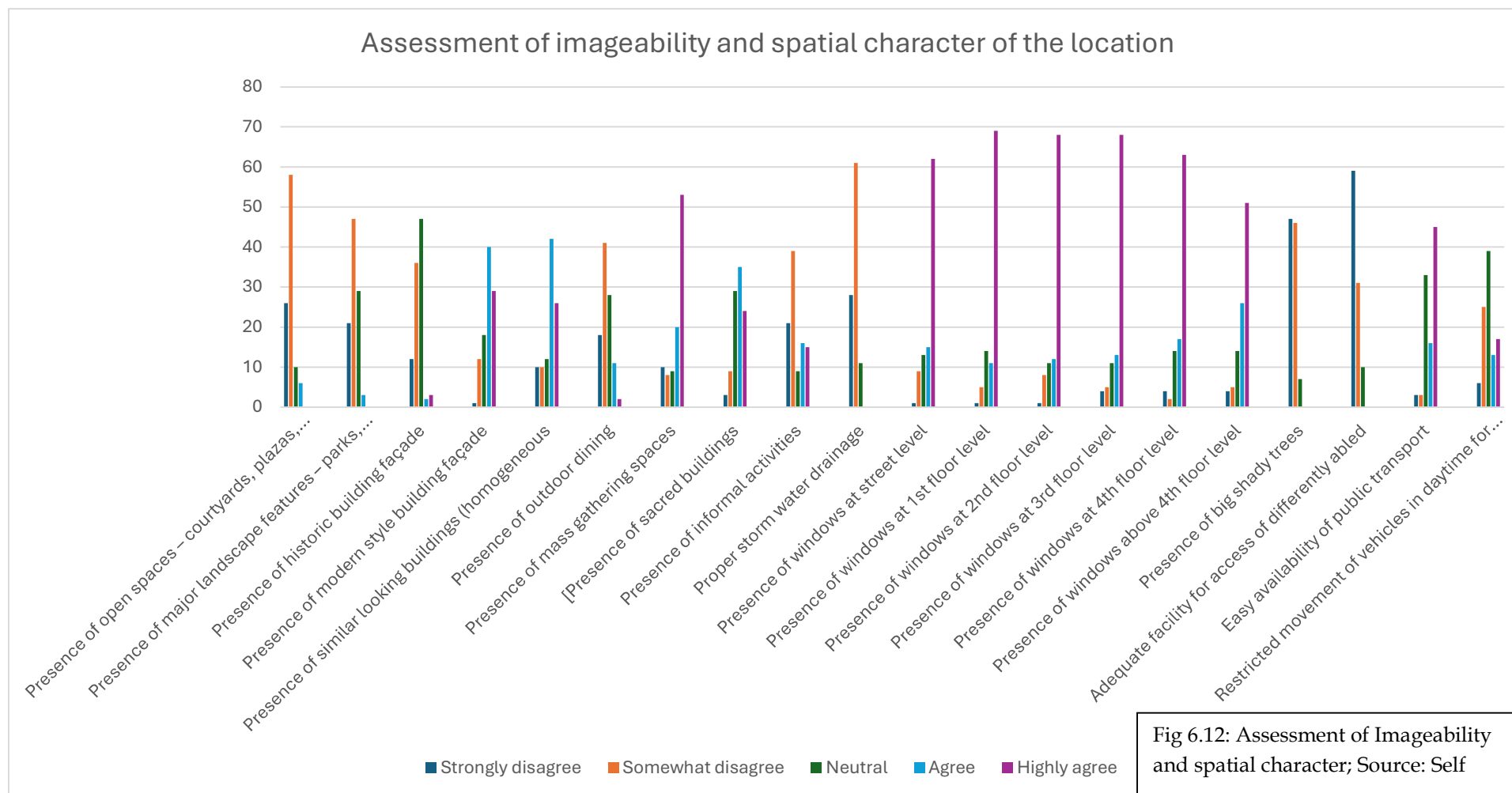


The chart above provides graphical representation of the responses by the users, residents, and subject experts alike, on the development pattern and existing public infrastructure. From the given response the major inferences are as follows:

1. There is a scarcity of the proper parking places in the vicinity. As observed this is majorly attributed to the irrational development and lack of space being considered for the same. This often leads to congestion in the Lingaraj Temple area.
2. No separate movement routes have been earmarked for pedestrian and vehicular movement, leading to chaos. Owing to the pilgrimage nature of the locality, there is always a high inflow of tourists and without any bifurcation in movement, this area will be more chaotic.
3. Pedestrian movement is highly inorganized with hardly any management using indicators, barricades etc. This often lead to stampede like situations during major festivals and even during peak pilgrimage seasons.
4. Owing to the Lingaraj temple and Bindusagar lake, this place is flocked by pilgrims who often want to spend considerable time in the area. However, with shortage of proper seating and resting places, this area is likely to develop unrest amongst tourists, leading to untoward situations.
5. Public convenience for the users and tourists are well marked. This has been a recent improvement with the increase in influx of tourist to this place.
6. Odisha in general has a highly developed water supply system and this place of Bhubaneswar being no different has a good network of water supply systems to the households and public places.
7. Being the old part of the city, this area lacks proper storm water drainage systems. This can be largely attributed to unscrupulous development of public and private infrastructure.
8. In some parts of the old city, around Lingaraj, there are still some kuccha roads. This could be due to litigations on land and issues alike.
9. The vicinity of Lingaraj needs proper definition of nodes to ensure holistic development. Most of the users disagree with the availability of nodes in this area leading to improper traffic movement and dissolution of urban characteristic of the place.

10. With modern unthoughtful development of both public and private infrastructure, the landmarks – majorly the temples and tanks are not clearly visible, obfuscating the character of the space.
11. As observed and confirmed by the respondents, this part of the city being the historic part has developed in an organic manner without any consideration of modern aesthetics. It polar with the Lingaraj Temple and Bindusagar temple being at the centre. Even the public infrastructure is developed without any thought and any specific pattern of development.

B. Assessment of imageability and spatial character of the location (Ref: Fig. 6.12)

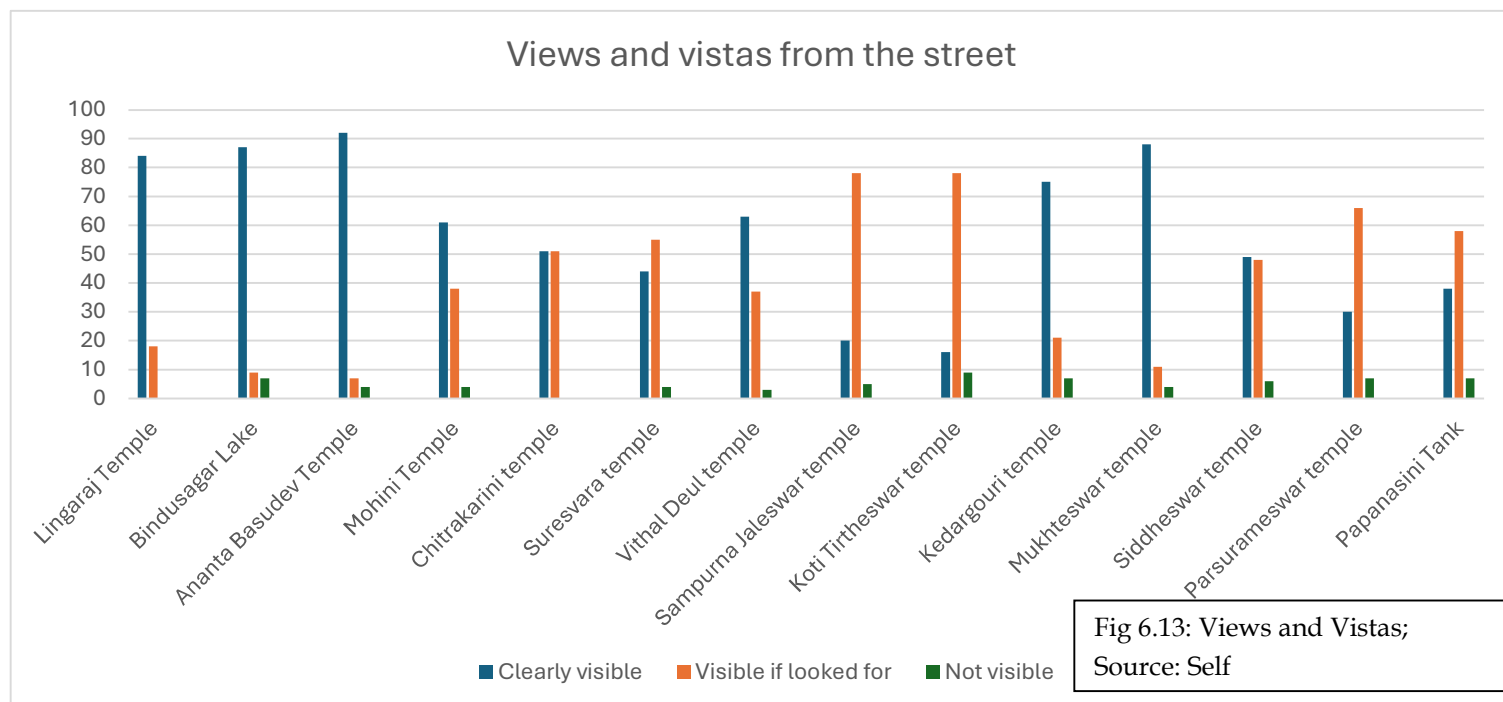


The chart above provides graphical representation of the responses by the users, residents, and subject experts alike, on the imageability and spatial character of the location. From the given response the major inferences are as follows:

1. Though there are some open spaces developed recently, there is still a severe crux of open spaces for public gatherings and resting on a regular basis.
2. The area lacks any major parks or spaces which can be utilised by the locals for morning walks, exercises, recreation etc. This can be attributed to the unscrupulous development.
3. Most people agree that the area contains a sizeable number of historic facades, majorly due to the presence of temples, mathas and other older structures such as tanks.
4. A significant number of modern buildings have now mushroomed in the vicinity, with little respect to the historic character of the place.
5. As indicated by the experts and residents, most of the buildings look similar in design and present some sense of homogeneity, which is a positive sign in terms of urban design philosophy.
6. Most of the residents and visitors, experts alike have complained of absence of any identified open dining spaces. This vicinity thrives on the temple culture where prasad is served at least twice in a day and then the prasad is distributed to the visitors and residents. With lack of any designated open spaces, people often start consuming food along the streets making it unsightly and unhygienic.
7. Though there are no designated places for resting and food, recent developments have made way for mass gathering spaces, which is highly essential during the festive seasons.
8. The space is dotted with several historic temples and thus mostly agree on the presence of sacred spaces – temples and tanks.
9. There is hardly any space for informal gathering. Often the old cities in India have the culture of informal gatherings every day, wherein friends and acquaintances meet regularly. With absence of spaces earmarked for these activities, of the roads are encroached.

10. Naturally, the land would have sloped towards the nearest lakes. However, with unscrupulous development changing the original contour of the area, there is a dire need for proper storm water drainage system. Majorly, the people agree against the availability of an efficient storm water drainage system.
11. Windows, in most of the structures are built in a manner that the temples are visible. This is also be termed as a connect between the human and divine. However, with the recent splurge in tourism, there has been unthoughtful development in this aspect and this character is lost. Often the windows on the street are not in synchrony to each other making the larger facades often confusing and chaotic.
12. The site is majorly devoid of any major trees. As the name Ekamra classifies, the Shiva Linga was beneath a single mango tree, indicating the presence of several trees and orchards in the vicinity. Some archival images on the web too suggest adequate plantation in this area. However, these have eventually been mowed down to allow modern development.
13. With recent development of the area around the Lingaraj Temple and Bindusagar, no thought has been given for access of the elderly and differently abled, adding further to their woes.
14. This place has been the cynosure of development since decades with initial development around this area. This has ensured that there is appropriate public transport system available in this area. Also, with a lot of tourists flocking this place, the public transport system has to be adequate.
15. Lately, the public authorities have issued directions for restricted movement of vehicles through this area in the peak time of the day. However, this is yet to be effective and people do suffer from traffic congestion.

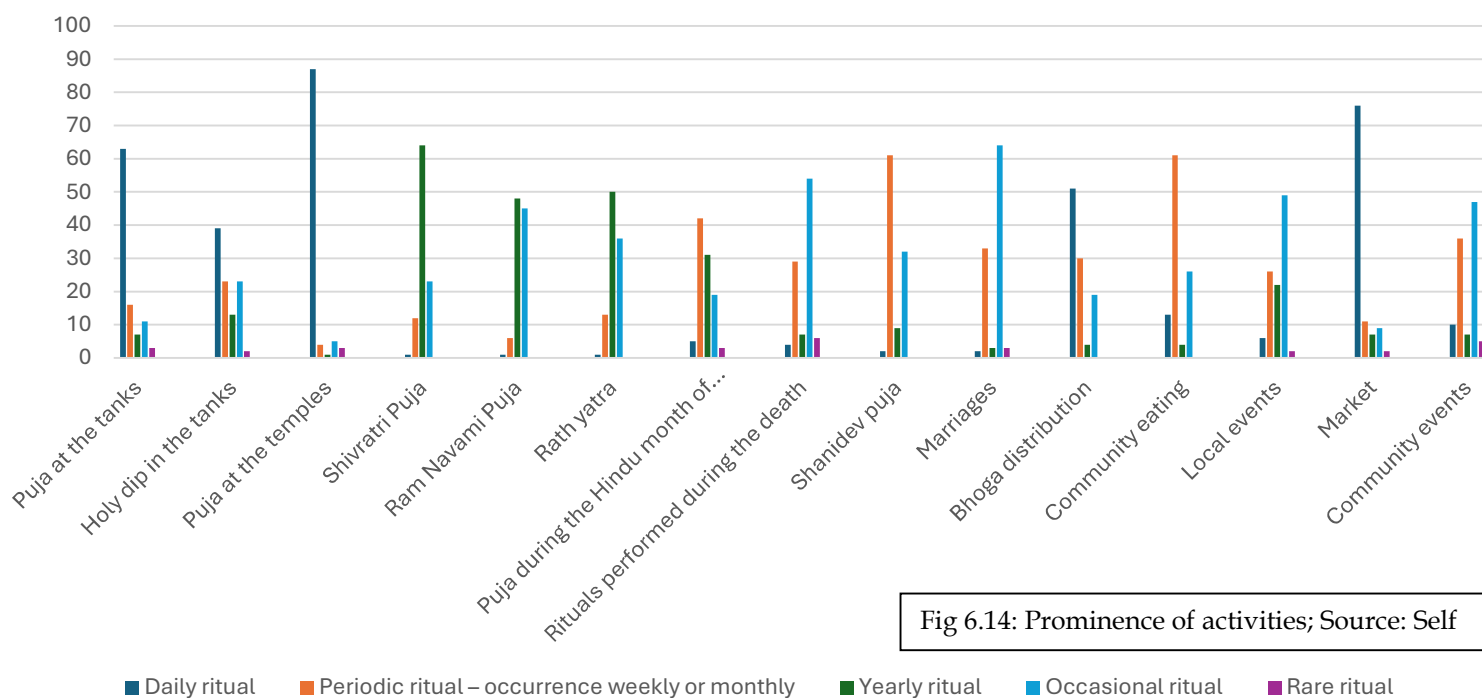
C. Views and vistas from the streets (Ref: Fig. 6.13)



As indicated in the figure, of the 14 historic structures located in the vicinity, 7 temples are clearly visible from the streets. This include the Lingaraj, Bindusagar lake, Anant Basudev, Mohini, Vithal Deul, Kedargouri, Mukhteswar. The temples of Chitrakarini, Survesvara, Siddhesvara, Sampurna Jaleswar, Koti Tirtheswar, Parsurameswar and Papanasini Tank need to be looked for and can easily be located in the vicinity. This data clearly indicates the respect these historic structures have in the life of the commoners due to which these still remain.

D. Prominent activities and their affect (Ref: Fig. 6.14, 6.15)

Based on your observations, rank the level of prominence for the activities that are undertaken in this area



Owing the spiritual belief between the divine and the commoners in this area, a lot of related activities are prominent in this area. They can be classified into daily, periodic, yearly occasional and rare activities.

As per the research, the daily activities include

- Puja at tanks
- Holy dip in the tanks
- Temple pujas.
- Bhoga or prasad distribution
- Market

Similarly, periodic and yearly rituals include the Shivratri Puja, Rath yatra, Ram Navami, death rituals, Hindu Shravan month puja, Shanidev puja and community eating. Occasional and rare rituals include marriages, local events and community events. All of these events / rituals impact the day to day activities of the locals to some extent which is marked as per the survey below (Fig. 6.15).

Based on your observations, rank the level of the activities that effect this area

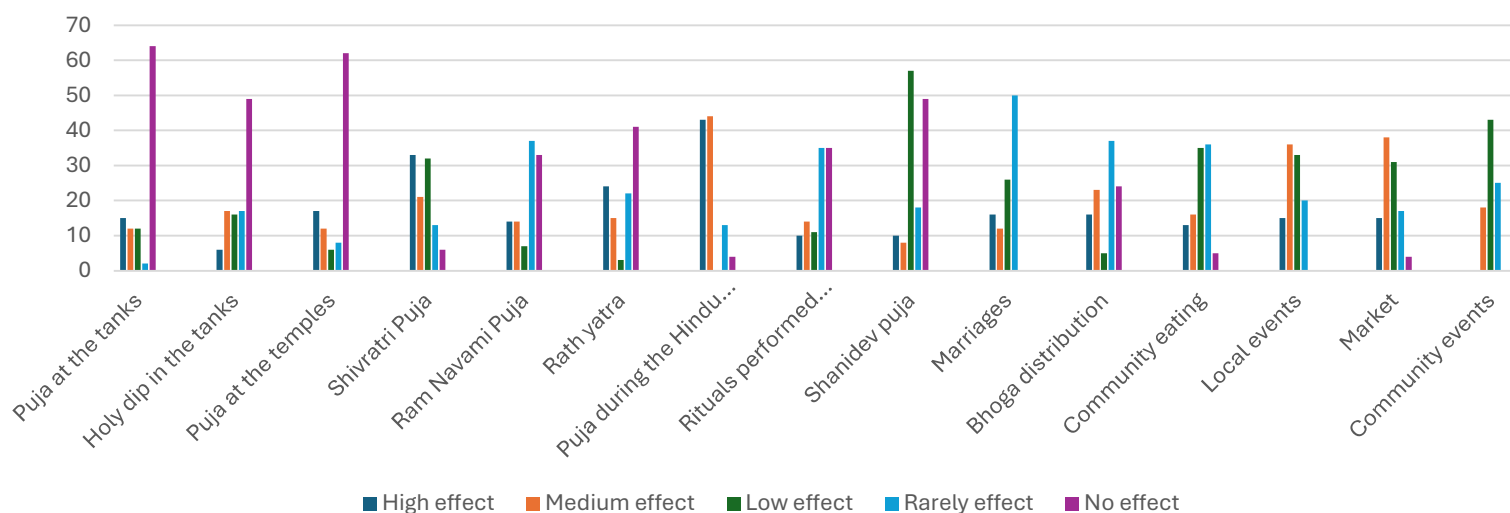


Fig 6.2.15: Affect of activities; Source: Self

As per the survey, events which occur on a regular basis, mostly the daily events have minimal effect on the daily activities. Major events such as puja during the holy month of Shravan, Shivratri have major affect on normal life. This is due to the severe influx of tourists for the rituals thereby uprooting the daily life. Besides, local events such as markets, specific rituals, political gathering etc do also affect the regular lifestyle of the area.

E. Affect of infrastructure development on lifestyle (Ref: Fig. 6.16)

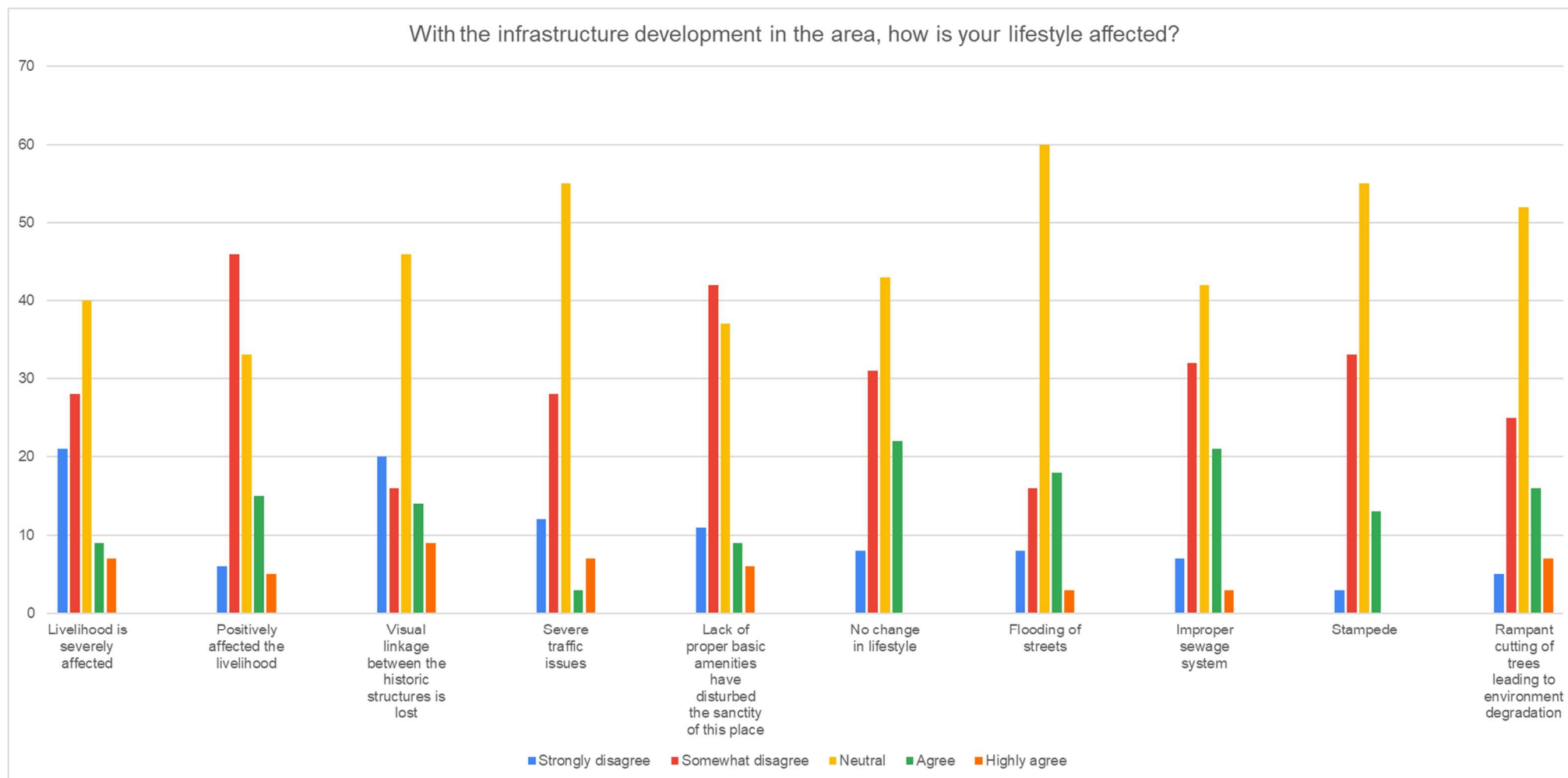


Fig 6.16: Affect of infrastructure development; Source: Self

As indicated in the survey, there hasn't been any significant change in the lifestyle of the residents due to infrastructure development. Most of the respondents agree that the infrastructure development has positively affected their lifestyle. Surprisingly, many believe that the visual linkage to the historic structures is not lost due to infrastructure development. This may be due to the recent awakening of the masses and sensitivity towards heritage. However, many believe the traffic issues haven't changed and it remains the same. Proper basic amenities are still a shortcoming in the developments and continue to disrupt and downsize the sanctity of the place due to unhygienic conditions such as littering, lack of waste management etc. There hasn't been any significant change in the flooding systems as it does recur every year, improper drainage still haunts the locality and often cutting of trees have led to a very dry and hot micro climate in the region. Stampede like situations do arise during important festivals.

F. Possible solutions as per the respondents (Ref: Fig. 6.17)

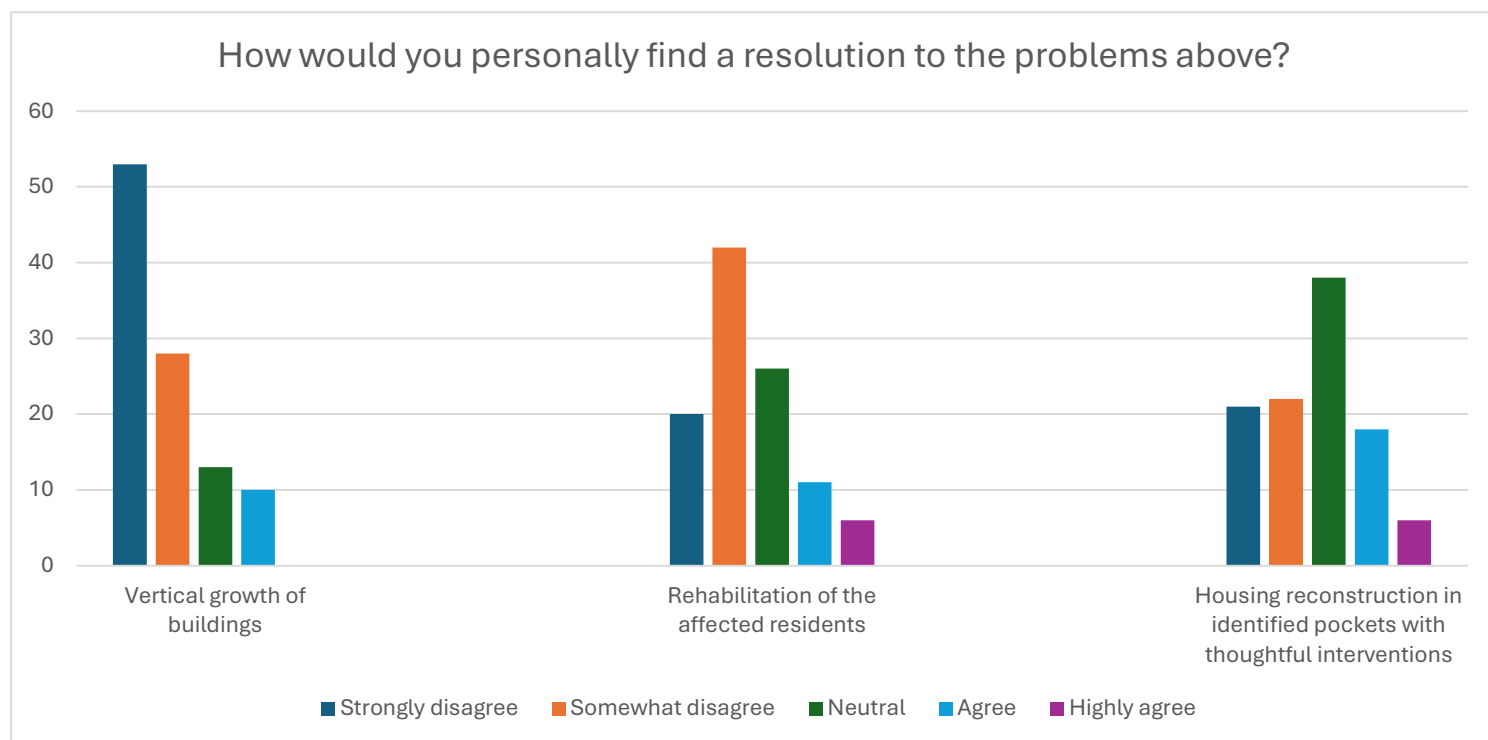


Fig 6.17: Personal Solution; Source: Self

When asked about the possible solution to the woes and other challenges in the locality, majority of the people have disagreed on vertical growth and rehabilitation. This is due to the spiritual connect which these respondents hold to the historic structures and their significance in their daily lives.

Many believe that the best solution is to identify the pockets in the same vicinity and plan for a thoughtful reconstruction of houses to accommodate the residents while also allowing a holistic development. Further details on this will need to be assessed based on the needs.

6.4. Summary of Findings:

Table 6.1: Key User and Expert Insights on Urban Issues in *Ekamra Kshetra*
(Source: Author's field survey and expert consultations, 2025)

Parameter/ Theme	Observed Issues (User and Expert Responses)	Interpretation/ Implication for Urban Management
Demographic Composition	Majority of respondents are long-term residents; fewer youth and professionals participated due to migration and employment elsewhere.	Indicates an ageing local population with deep emotional and cultural ties to the temple precinct but limited economic engagement.
Perception of Infrastructure	Roads are narrow and congested: drainage, sanitation, and solid-waste systems are inadequate.	Reflects weak service infrastructure in heritage zones; calls for integrated urban infrastructure retrofitting without harming historic fabric.
Housing and Built Form	Encroachments and incremental vertical additions visible, setbacks and open spaces largely absent.	Highlights unregulated densification threatening visual and structural integrity of traditional morphology.
Cultural and Ritual Activities	Daily and festival rituals generate intense yet temporary surges of pedestrian and vehicular activity.	Necessitates adaptive spatial planning temporary pedestrianisation, crowd-flow management, and festival- specific traffic design.
Heritage Awareness	Users recognize importance of Lingaraj and Ananta Basudev temples but remain unaware of smaller shrines.	Demonstrates uneven heritage literacy: need for signage, guided trails, and interpretation centres to expand cultural appreciation.
Tourism and Visitor Movement	Absence of defined tourist routes, signage, public toilets, and information kiosks.	Tourist experience remains fragmented; requires coordinated heritage

		tourism infrastructure and wayfinding systems.
Traffic and Parking	High congestion due to mixed slow- and fast-moving traffic; lack of designated parking areas.	Suggests urgent need for peripheral parking, shuttle services, and regulation of vehicular entry during peak periods.
Waste and Water Management	No centralized wastewater treatment; indiscriminate dumping of solid waste near tanks and drains.	Environmental degradation risks; mandates decentralized treatment units and community-based waste segregation.
Aesthetic and Visual Character	Traditional skyline interrupted by modern high-rises; footpath commercialisation reduces visual coherence	Loss of historic skyline and pedestrian quality; supports implementation of building-height controls and façade guidelines.
Socio-economic Dynamics	Rise of informal slums and real-estate encroachments; fear of eviction among low-income groups.	Indicates socio-spatial inequality: suggests need for inclusive rehabilitation policies within conservation planning.
Expert Observations	Experts advocate heritage-sensitive development, better coordination among ASI, State Archaeology, and BDA.	Reinforces governance reform and multi-agency collaboration as critical for sustainable heritage management.

Summary

The collective responses from users, residents, and experts reveal a complex interplay between heritage conservation and urban pressures in the Ekamra Kshetra precinct. While the area retains a strong cultural and emotional attachment among long-term inhabitants, inadequate infrastructure, rising encroachments, and visual disruption from unregulated development threaten its historic integrity. Experts emphasize the urgent need for coordinated action among heritage and planning authorities to

balance ritual, residential, and tourism demands. The findings underscore that sustainable revitalization must integrate physical upgradation with social inclusion, cultural sensitivity, and environmental management. A comprehensive framework that addresses traffic, waste, and heritage awareness simultaneously will be crucial in ensuring that the sacred landscape of Ekamra Kshetra evolves as a living heritage environment rather than a museum precinct detached from its community life.

6.5. Conclusion:

As demonstrated above, a bi-forked survey methodology was adopted to study the impact of urbanisation in a selected part of the historic city in Bhubaneswar. The feedback received from the users, residents and subject matter experts have further highlighted the issues faced in these urban areas in the vicinity of heritage structures – temple towns. There is lack of proper parking facilities, resting facilities, segregation of movement – vehicular and pedestrian, often leading to chaos in the area. There are a series of rituals performed in this area owing to the sacred nature of the place. This is often juxtapositioned with modern development, often clashing or compromising the sacred environment. Unscrupulous development, arbitrary movement, decisions in part to whole for improvements have often been a road block leading to even more disorder. All of this brought together have also unfavourably affected the pilgrimage of the area.

Urbanization has disdainfully affected the homogenous temple town of Bhubaneswar, like every other similar city in the country. Studies are being undertaken in this regard on how the adverse effects can be altered, reversed or withheld and holistic solutions are being tried. The physical, social, and economic fabric of an area is significantly influenced by its development patterns and public infrastructure. By carefully assessing these elements, urban planners and policymakers can make informed decisions to guide the city's growth and evolution. There is a dire need of development of a heritage district for this area, with an Urban Arts Commission or similar authority being established for comprehensive development of the similar urban areas. Facades

need to be homogeneous and something which should not compete with the grandeur of the historic structures while at the same time clearly demarcating the historic structures. Mutual respect for history and modernity should be present in the urban development.

This study is an attempt to highlight the key issues in urbanization and the case study of Bhubaneswar will certainly help in formalizing an ideal solution with involvement of stakeholders alike as the respondents here.

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7. Results and Discussions

7.1 Introduction

As one of the world's fastest-developing nations, India grapples with the impact of progress on its ancient urban centers. Cities like Banaras, Prayagraj, Madurai, Mahabalipuram, Kolkata, Patna, and Delhi are living testaments to centuries of history and transformation. However, urban development in these historic locations, especially in recent decades, has caused them to grow into sprawling metropolises. This rapid expansion often sacrifices the distinctive qualities that once defined these urban cores, causing the rich history of many ancient cities to fade under the pressures of modern development (Praharaj, 2012).

Our cities are slowly losing their heritage, with many historically significant zones now in disrepair. Originally, diverse religious and socio-cultural practices led to the creation of various sacred structures and their surrounding settlements. Over time, temples became central to civic and social life. These religious precincts in temple towns weren't just places of worship; they also served as cultural and philosophical hubs, actively boosting the city's economy through retail and commercial activities. (M.Rajakumari, 2019)

Odisha boasts a rich and diverse cultural heritage, evidenced by its Hindu, Buddhist, and Jain sculptures. References to Kalinga and Odra, ancient names for the region, appear as early as the Mahabharata (M.K.B. Das, 2019). The capital city of Bhubaneswar gets its name from Lord Shiva, its presiding deity, who is known as "Tribhuvaneswara"—meaning "The Lord of the three worlds." This name was popularly shortened to Bhubaneswar, giving the city its identity. As a significant religious hub, the temple town was also famously called "Ekamra Kshetra." According to legends, its sanctity originates from a time when a single mango tree stood over a Shivalinga. This religious center developed around that spot, culminating in the 11th-century Lingaraja Temple. This fully established Ekamra Kshetra as a major center of Saivism (Shiva culture). Despite centuries of change, Bhubaneswar remains a vibrant pilgrimage destination in Odisha (Mishra, 1989). The remains of Ekamra Kshetra —

including Buddhist, Jain, and Hindu monuments spanning from Sishupalgarh Fort to the Khandagiri caves – still provide rich historical evidence. Ancient ponds and water bodies, crucial to Odishan societal traditions, are also present alongside the temples. These monumental developments suggest the historical formation of 'Astayatana' (eight sacred complexes), strategically located based on geography. Regrettably, modern urban planning has entirely ignored these vital elements, effectively erasing the social and religious contours of this historic settlement.

To effectively preserve our heritage buildings, we must identify what obstructs the continuity of their heritage values. This study of Ekamra Kshetra integrates historical and modern urban strategies, introduces a conceptual framework. This framework aims to analyse urbanization's impact on built heritage for offering practical guidelines to prevent unplanned, haphazard, and unnecessary alterations to historic buildings within the town's older areas. Ultimately, it's vital to revive the lost heritage essence and identity of urban historical centers from the damaging effects of urbanization.

To achieve the objective of this study, key performance indicators/parameters were identified using secondary resources. The identified parameters are . Height of the building (Lourenco, 2013), Existing treatment of the façade (Menon, 2014), Category (use) of the building (H. Mekonnen, 2022), Material used for construction (S. Abdul Huq, 2024), Construction technology used (RCC or Load bearing structure) (Menon, 2014), Footprint of the structure (K. Attarian, 2022), Tentative year of construction (Chen, 2020), Floor to floor height as visible (K. Attarian, 2022), Approximate size of the plot (Lourenco, 2013), Aspect ratio of the building (front width: side depth) (S. Abdul Huq, 2024), Any other significant observation (H. Mekonnen, 2022). Based on these parameters, a comprehensive visual survey was conducted over three months. During this period, every street in the selected study area was visited, and all abutting houses were documented. In total, over 450 structures were surveyed. The Ekamra Kshetra – a settlement originated in the 12th century, which contained the Lingaraj Temple, Bindusagar and other significant temples was chosen as the study area. An area covering over 3 lakhs square metres, encircling four significant temples – the

Lingaraj, Chitrakarini, Mohini and Suresvara was considered for a detailed visual site survey. Parameters of morphology were shortlisted and accordingly a set of analytical questions was prepared for the survey. To further corroborate the study, a set of questionnaire was prepared for response from various users which included users, residents and subject matter experts.

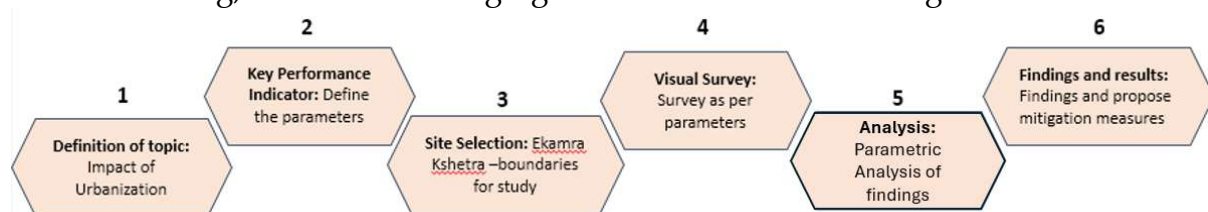
7.2 Literature Study

Urbanization is the process by which a society becomes more urbanized, meaning a greater proportion of its population lives in towns and cities rather than in rural areas. It's a fundamental shift that brings about profound changes in a country's economic, social, cultural, and environmental landscape (Davis, 1965). Kiruthiga and Thirumaran (2019) (Kiruthiga, 2019) in their study provides empirical evidence of how the multifaceted process of urbanization can erode the historical integrity of places like Kumbakonam. It then offers a concrete and urgent policy recommendation for local authorities to mitigate these negative impacts and safeguard cultural heritage through structured planning. Sasidhar, Jayanthi, and Nallusamy (2021) (Sasidhar, 2021) in their study provide crucial empirical evidence for the specific ways in which urbanization, particularly driven by commercial tourism, poses a direct threat to the tangible and intangible heritage of historic towns like Kanchipuram in India. The detailed observations, from land-use changes to the dramatic alteration of the skyline, underscore the urgency of implementing effective heritage conservation and urban planning strategies to balance development with the preservation of cultural identity. Chandan and Kumar (2019) (Chandan, 2019) provide a valuable macro-level perspective and policy advocacy for integrating heritage conservation firmly into the core of India's urban planning efforts, particularly for its vulnerable pilgrim cities. Gupta and Gahalot (2023) (Gupta, 2024) offer a crucial perspective on how globalization, by altering the nature of religious tourism, poses a significant threat to the authenticity and sacredness of places like Vrindavan, underscoring the urgent need for robust regulatory measures to preserve their unique spiritual and historical identity. Vishaliny and Kaur (2024) (Vishaliny, 2024) provide an insightful look into the challenges confronting Srirangam and, by extension, other Indian temple towns,

advocating for integrated, innovative, and sustainable solutions to preserve their invaluable heritage. The study by Udeaja et al. (2020) (Udeaja, 2020) on Surat, India, provides a critical perspective on the systemic issues affecting urban heritage in the country. It provides a strong argument that the challenges faced by India's historic urban areas are not merely localized issues but stem from a broader policy and planning vacuum. Their work underscores the urgent need for a fundamental reorientation of urban planning to prioritize heritage conservation and empower robust regulatory frameworks.

7.3 Research Methodology

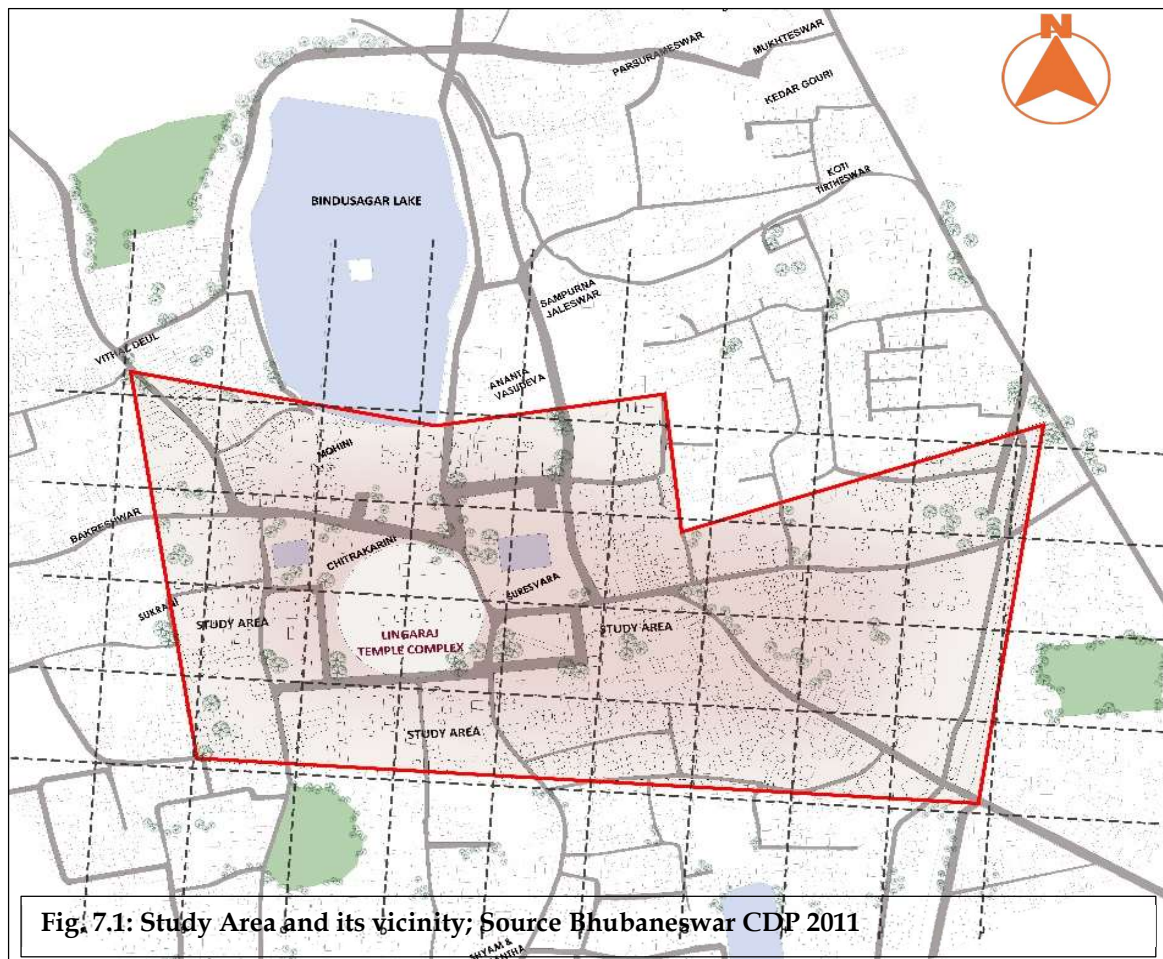
This research adopts a visual survey method after enumerating the parameters. Based on the parameters, a key information indicator is prepared for detailed study of the each of the structures in the selected study area. After collection of data, the information is put together to prepare charts. Based on the charts, a coding is developed to analyse the level of change viz., nominal, medium and significant. Based on these coding, the results are segregated and then model for regression and ordinal



study in statistical methods are adopted to determine the level of change (variable 'y').

7.4 Study Area

The Ekamra Kshetra – a settlement originated in the 12th century, which contained the Lingaraj Temple, Bindusagar and other significant temples was chosen as the study area. As indicated in Fig 7.1, an area covering over 3 lakhs square metres, encircling four significant temples – the Lingaraj, Chitrakarini, Mohini and Suresvara was considered for a detailed visual site survey. Significant lake, water tanks & Temples such as Bindusagar, Ananta Basudev etc are in the immediate vicinity of the selected area & effect the activities of the area to a great extent. Parameters of morphology were shortlisted and accordingly a set of analytical questions was



prepared for the survey. To further corroborate the study, a set of questionnaires was prepared for response from various users which included users, residents and subject matter experts. The selected area as shown in Fig.7.1, contains a rich concentration of historically and culturally significant landmarks. It includes the renowned Lingaraj Temple, Suresvara Temple, Mohini Temple, Chitrakarini Temple and the Papanasini Tank, each of which holds immense religious and architectural importance. Additionally, the site is situated in close proximity to other key heritage structures such as the Ananta Basudeb Temple and the Bindusagar Lake, creating a unique cluster of sacred monuments and water bodies. Together, these elements form the core of the ancient human settlement known as Ekamra Kshetra, which has been a focal point of spiritual and social life for centuries. Over time, this area has seen significant development, reflecting its continuous relevance and vitality across different historical periods. Recognizing its cultural and historical value, several initiatives have already been undertaken, and more are being proposed, aimed at the conservation, restoration, and sustainable development of this heritage zone to ensure

it's preservation for future generations. Following the completion of the detailed visual survey of populated area, the inputs were carefully studied and outcomes were analysed to demarcate, highlight the key issues which needs to be addressed. The visual study was then analysed based on ordinal methodology to determine the extent of change or the impact of urban in correlation to the selected parameters. The following part of this paper provides an in-depth assessment conducted of the analysis for each parameters mentioned above.

7.5 Analysis & Discussion

7.5.1 Building height

This parameter was selected to identify the quantum of changes in building height across the surveyed buildings, in order to assess whether the impact of urbanization is directly proportional to the number of taller buildings observed. It is important to note that in this ordinal regression model, the building height is not in the form of categories but as numerical values denoting actual height of the building.



Fig. 7.2 - (1) up to 3m



Fig. 7.3 - (2) 3.1-6m



Fig. 7.4 - (3) 6.1 & above

As mentioned in the Fig. 7.2, 7.3, 7.4, the building height has been classified into 3 category - (1) up to 3m (2) 3.1- 6m (3) 6.1 & above. This is a simple classification of buildings based on their height, which can help in understanding the urban structure or development pattern of an area. Up to 3 meters category are low-rise buildings or single-storey structures. Usually just the ground floor. These are found in traditional residential areas or small shops. 3.1 to 6 meters category buildings typically have two storeys – Ground + One Floor (G+1). Slightly taller than the first category. These are

found in moderately developed areas or expanded homes. The 6.1 meters and above category are multi-storeyed or high-rise buildings (G+2 and more). Often found in urban or commercial areas where space is limited, so people build vertically. These may include apartments, offices, or hotels. Fig. 7.5 represents the building heights on the map.

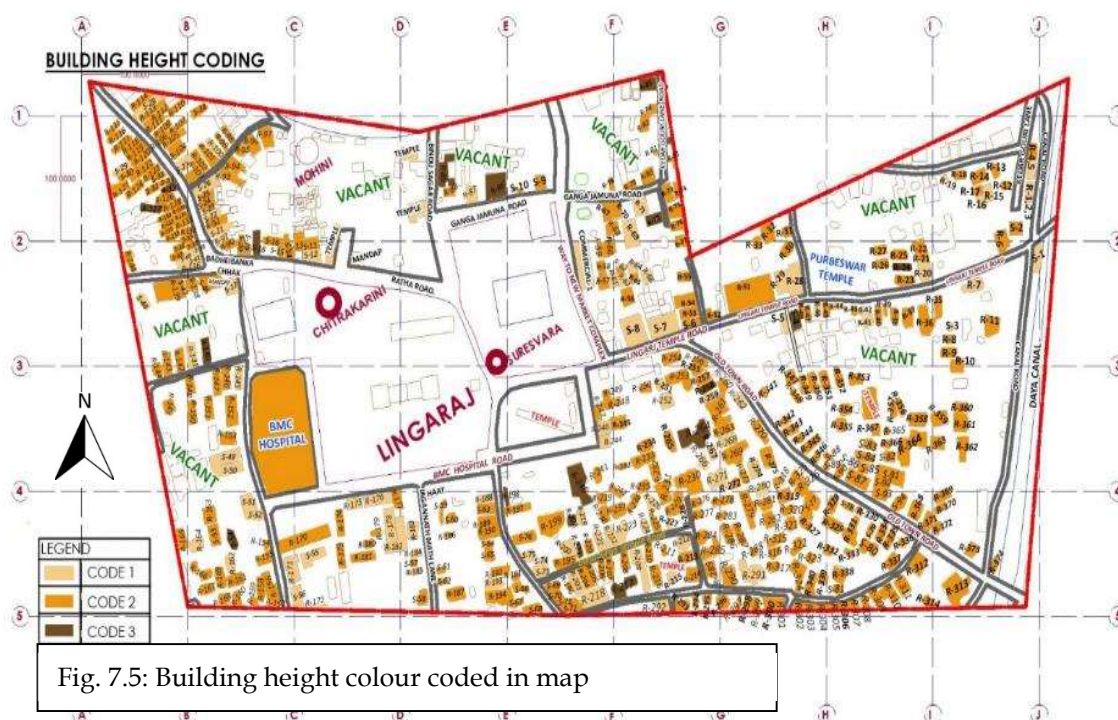


Fig. 7.5: Building height colour coded in map

Table 7.1: Frequency distribution and density plot of building height

Descriptive	Building Height
N	462
Missing	0
Mean	7.57
Median	6.00
Standard Deviation	4.71
Minimum	2.00
Maximum	60.0

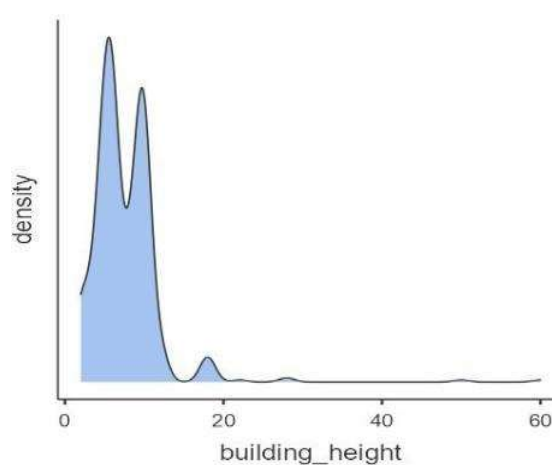
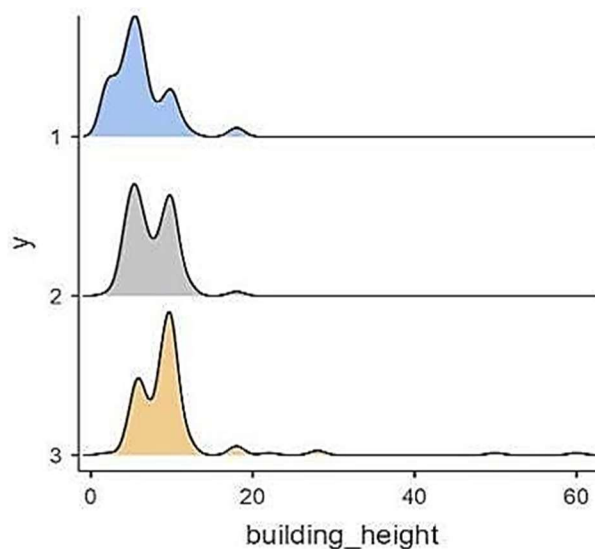


Table: 7.2: Frequency distribution (y) of building height (x1) for different build categories 1,2 and 3.

Descriptives	y	Building Height (x1)
Standard deviation	1	3.33
	2	2.70
	3	6.78
Minimum	1	2.00
	2	2.00
	3	2.00
Maximum	1	18.0
	2	18.0
	3	60.0



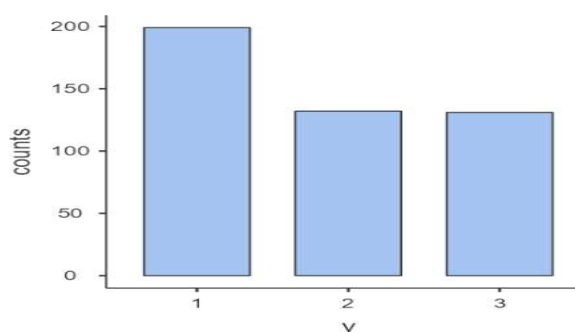
Observation – The above analysis (Table 7.1 and 7.2) highlights that the buildings heights are mostly concentrated within the 20 metres category. The standard deviation specifies 6.78 metres, a maximum of 2.00 metres and maximum of 60 metres of the building height.

Based on this, a regression model to determine the likelihood of change in them was undertaken. The frequency distribution model gave the following graph (Table 7.3).

Table: 7.3: Frequency distribution of the dependent variable y (the level of architectural changes) with the bar plot

Frequencies of y

y	Counts	% of Total	Cumulative %
1	199	43.1 %	43.1 %
2	132	28.6 %	71.6 %
3	131	28.4 %	100.0 %



'y' represents the three categories defined as 1,2,&3.

Observation - Based on Table 7.3 and the category wise mean building heights for build categories 1,2 and 3, it is determined that buildings with lesser height less likely

to have undergone architectural changes as compared to the buildings with greater height (43.1%).

A comparative analysis of building height with respect to the approach road was also undertaken to determine the effect of road width on the height of the building. This was done to understand the effect of urbanisation on buildings.

Observation - The graph (Figure 7.6) shows a relationship between road width and building height. It suggests that narrower roads tend to have higher building heights with higher population density, i.e., more people live in these areas (over 70 feet high buildings with approach road less than 6 meters). More buildings or closely spaced buildings exist.

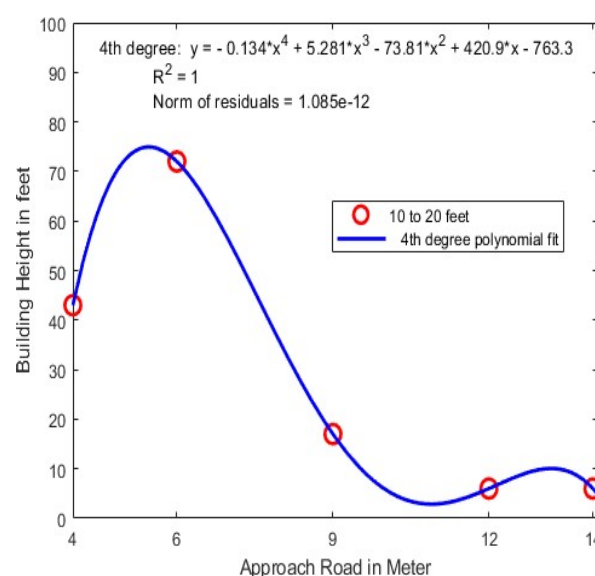


Fig. 7.6: Building height in relation to approach road

This is commonly observed in older parts of cities, like areas around temples or historical centers, where roads were originally designed to be narrow. Over time, these areas become more crowded due to urban growth and lack of space. The older "temple roads" are now densely populated and have more tightly packed buildings compared to newer, wider roads. In a gist, older areas are characterized with narrow roads now and have buildings with higher building heights.

7.5.2 Storey

This parameter was selected to identify the quantum of changes in building storey across the surveyed buildings, in order to assess whether the impact of urbanization is directly proportional to the number of storeys. It is important to note that in our ordinal regression model, we did not include the form of categories but actual no. of storeys. This refers to the number of levels or floors in a building. As seen in Fig. 7.7, 7.8 and 7.9, the storeys can be classified into 3 categories. The buildings can be grouped into three types based on the height from the ground to the top of the structure. (1) Ground Floor - it usually means the building has only one level. These are called

Ground storeyed buildings. (2) Ground Floor + First Floor - it typically includes two levels. These buildings are slightly taller than single-storey buildings. (3) Ground Floor + 2 or more floors - the building usually has G+2, G+3, etc. This category includes multi-storey and high-rise buildings.



Fig. 7.7 - (1) Ground



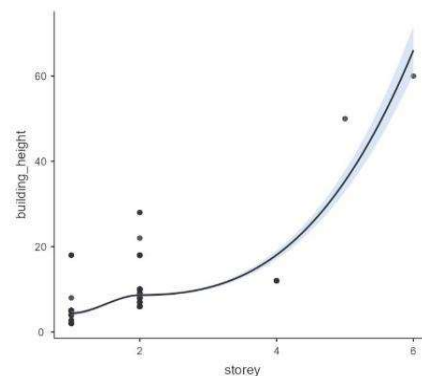
Fig. 7.8 - (1) G+1



Fig. 7.9 - (1) G+2 or more

Table: 7.4: Frequency distribution of storey (x2) which is a ratio variable.

Frequencies of storey			
storey	Counts	% of Total	Cumulative %
1	143	31.4 %	31.4 %
2	296	64.9 %	96.3 %
4	15	3.3 %	99.6 %
5	1	0.2 %	99.8 %
6	1	0.2 %	100.0 %



Observation - Based on the graph as shown in Table 7.4, the two independent variable storey and building heights are related and if one increases, the other one also increases (6 storeyed above 60 feet high).

7.5.3 Facade Treatment

This parameter was selected to identify the quantum of changes that have occurred in the facade treatment of the building surveyed so as to understand if the impact of urbanization is directly proportional to the change in the number of built facades of the buildings. In this parameter, the structures are categorized based on the treatment of the facades as indicated in Fig. 7.10, 7.11 and 7.12. In this case, (1) Classical represents facades which historically existed during the 19th and 20th century. These typically contained terracotta tiled roof brick walls and generally rose up to the

maximum of G+1. (2) Colonial facades represent structures with exposed stone or brick walls with modern slope roofing such as asbestos, CGI sheets, etc. They rose up to a maximum of G+2. (3) Contemporary façade represents modern structures built since the formation of new capital of Bhubaneswar in 1951. Cement, steel, RCC, glass etc., are prime components of this particular façade treatment. Fig. 7.13 represents the façade treatment categorised on the map.



Fig. 7.10 - (1) Classical



Fig. 7.11 - (2) Colonial



Fig. 7.12 - (3)
Contemporary

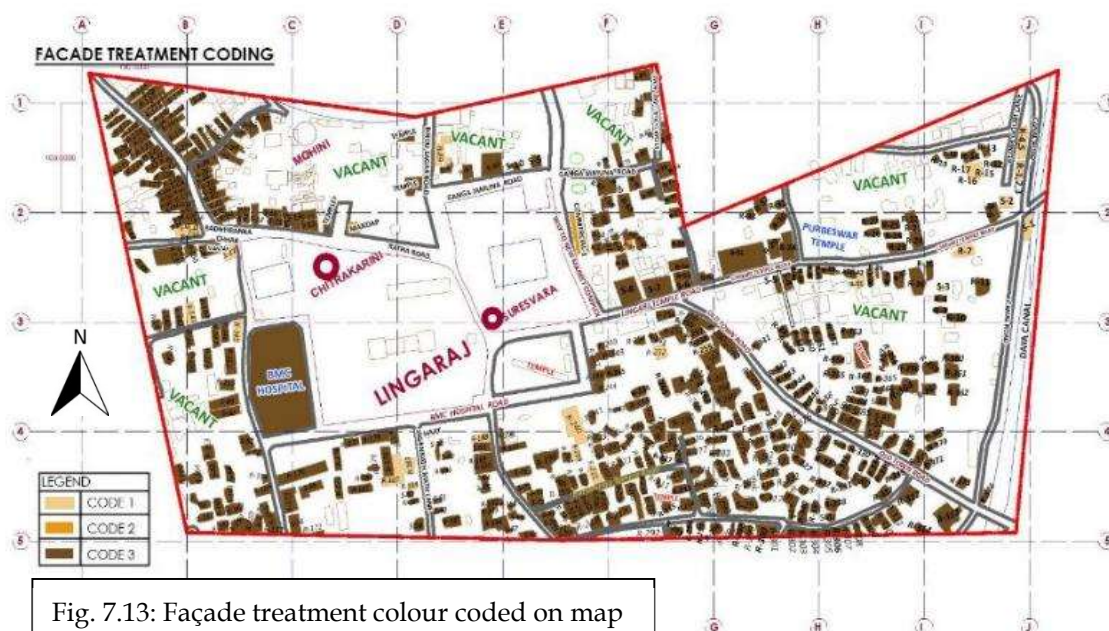


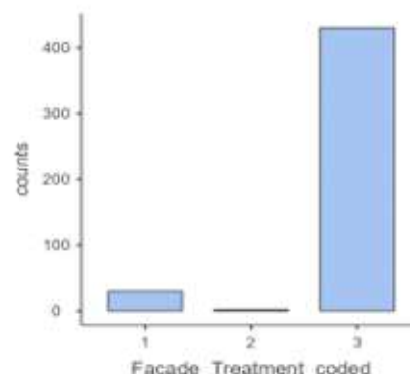
Fig. 7.13: Façade treatment colour coded on map

Observation – As per the modelling shown in Table 7.5, the category 2 – colonial buildings have only a handful structures which indicate that there has been minimal impact of colonization in this area.

Table: 7.5: Facade treatment coded frequency distribution and bar chart.

Frequencies of Facade_Treatment_coded

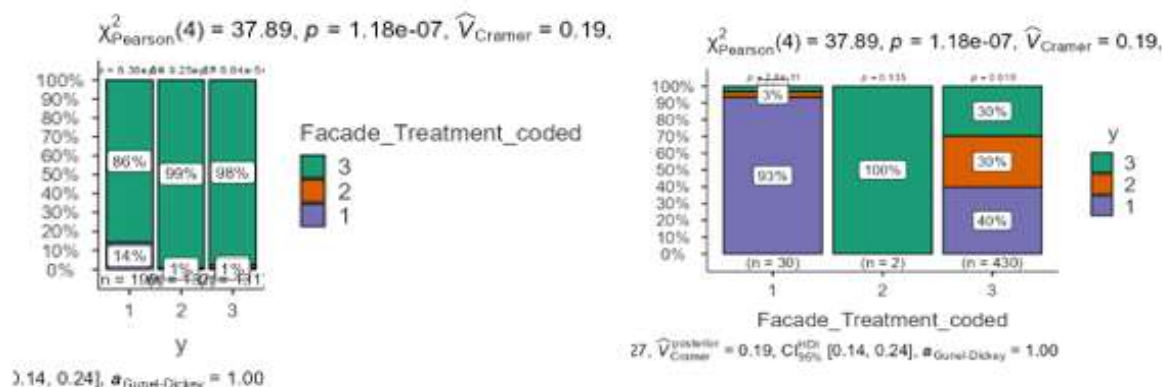
Facade_Treatment_coded	Counts	% of Total	Cumulative %
1	30	6.5 %	6.5 %
2	2	0.4 %	6.9 %
3	430	93.1 %	100.0 %



To understand the level of change that has occurred in the studied buildings, a correlation model (Pearson co-efficient and Cramer's V) was studied to determine the distribution of façade treatment over the years and how likely it has changed over the years.

Observation - Table 7.6 highlights that classical facade type (1) is likely to have the least architectural changes and buildings which have contemporary facade (3) is likely to have medium architectural changes, and buildings with colonial façade (2) are likely to have maximum architectural changes.

Table: 7.6: Distribution of facade treatment according to y=1,2,3 and distribution of y according to facade treatment.



7.5.4 Types of building

The type of building will help in determining the probability of change due to urbanization. In this parameter as shown in Fig. 7.14, 7.15 and 7.16, the structures are categorized based on the types of building based on their usage. In this parameter (1) Residential category represents structures which are used typically for residential purpose. This includes both owned and rented houses of all sizes and heights. (2) Commercial category comprises of structures used for shops, public institutions, community centres or any building used for any commercial purpose. (3) Mixed category represents structures which have both commercial and residential usage.



Fig. 7.14 (1) Residential



Fig. 7.15 (2) Commercial



Fig. 7.16 (3) Mixed

This can be a shop cum residence, shopping complex at ground level and residences above etc. The buildings are categorised on the selected area map as shown in Fig.7.17.

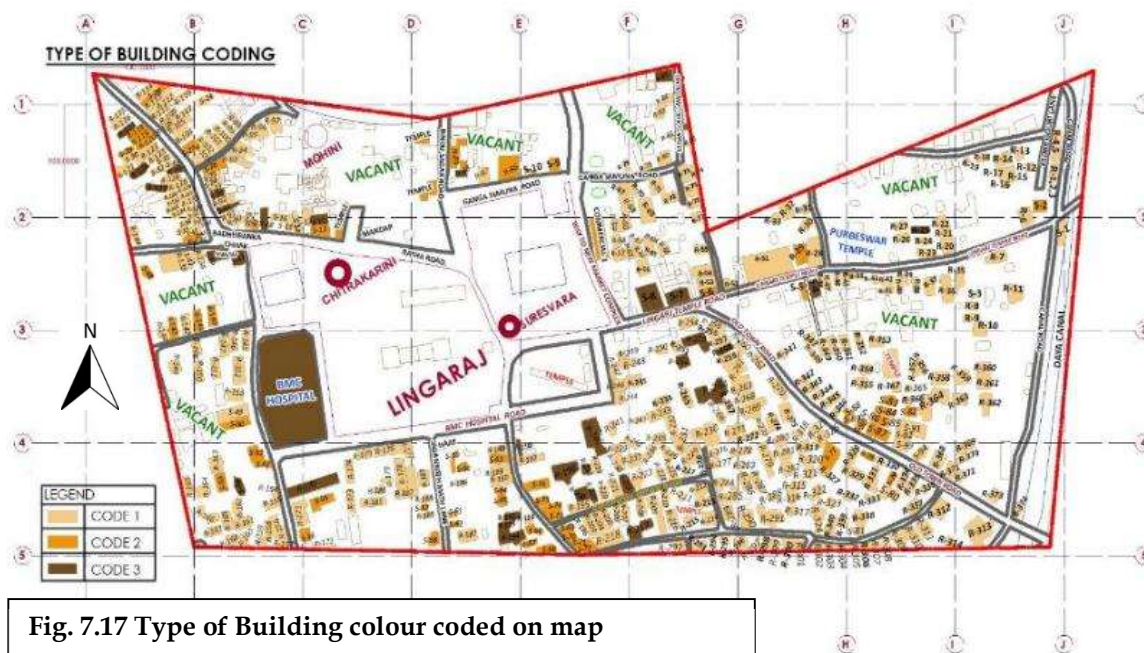
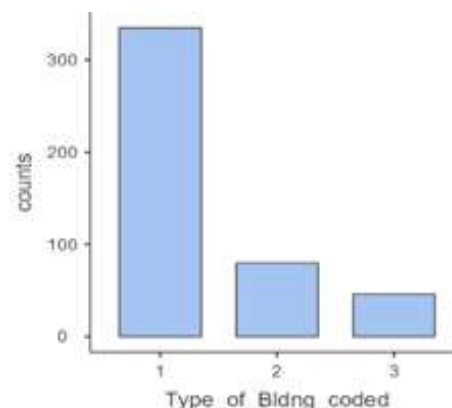


Fig. 7.17 Type of Building colour coded on map

Table: 7.7: Type of building coded frequency distribution and bar chart.

Frequencies of Type of Building coded

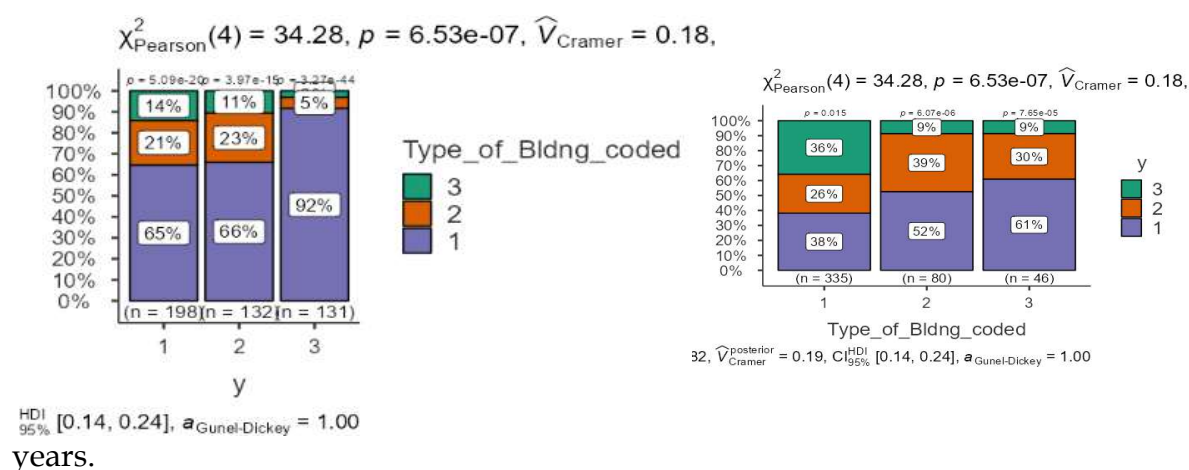
Type of Bldng coded	Counts	% of Total	Cumulative %
1	335	72.7 %	72.7 %
2	80	17.4 %	90.0 %
3	46	10.0 %	100.0 %



Observation – As per the model shown in Table 7.7, category 1, residential buildings are mostly present in the area (72.7%). However, it is to be noted that many of these residential buildings actually are provided on rental basis to people without notice of authorities.

To understand the level of change that have occurred in the studied buildings, a correlation model (Pearson co-efficient and Cramer's V) was studied to determine the distribution of type of buildings over the years and how likely it has changed over the

Table: 7.8: Distribution of building type according to y=1,2,3 and distribution of y according to building types



Observation - Based on Table 7.8, it is ascertained that Residential cum shop buildings are likely to have least architectural changes. Buildings which are commercial are

more likely to have more architectural changes. Only residential buildings are the ones with maximum architectural changes.

7.5.5 Material Used

This parameter was selected to identify the quantum of changes occurred into the materials used of the building surveyed so as to understand the impact of Urbanization if directly proportional to the changed number of materials used in the buildings.



Fig. 7.18 -(1) Temporary



Fig. 7.19 -(2) Historic



Fig. 7.20 -(3) Modern

The structures are categorized based on the materials used in the buildings as represented in Fig. 7.18, 7.19 and 7.20. In this case (1) Temporary represents materials like Polythene and brick exposed, Bamboo framing & sheet, Brick, cement and Asbestos sheet roof, etc. (2) Historic/Traditional; facades represent structures with Brick, cement and tiled roof, Brick, Stone, sand etc. (3) Modern represents Cement plaster, steel, RCC, glass etc. Which are prime components of this particular façade treatment. Fig. 7.21 indicates material used coded on the site map.

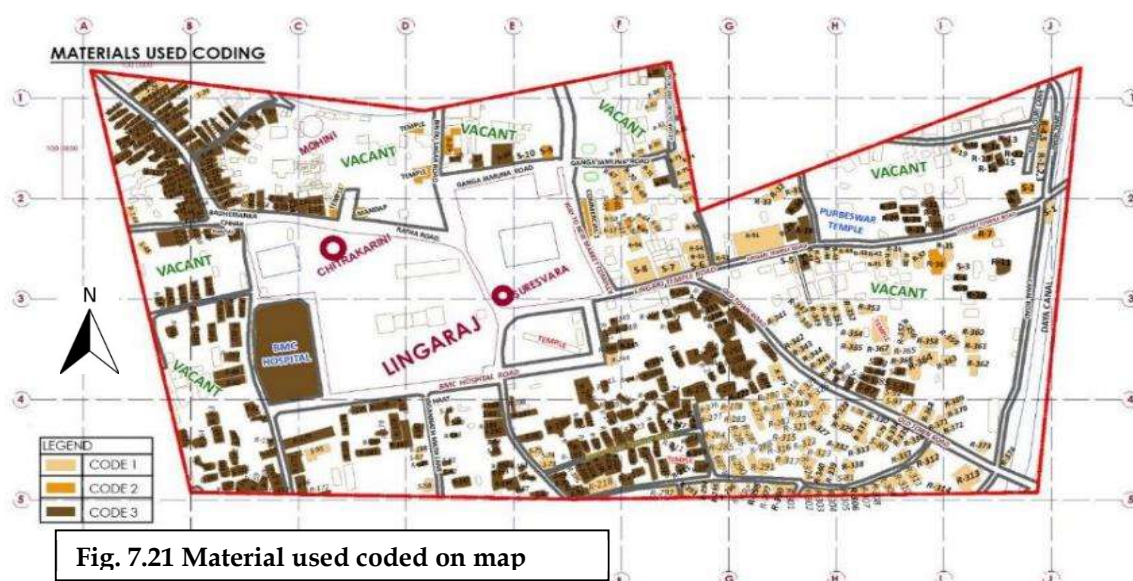
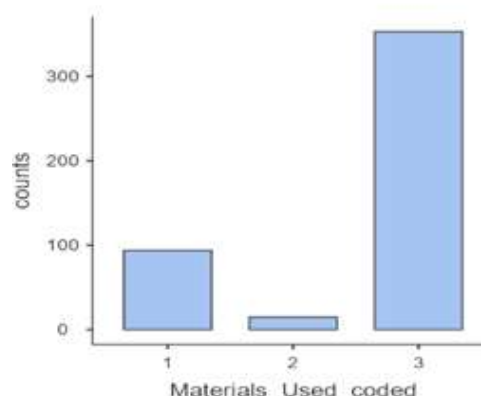


Table: 7.9: Materials used coded frequency distribution and bar chart.

Frequencies of Materials Used coded

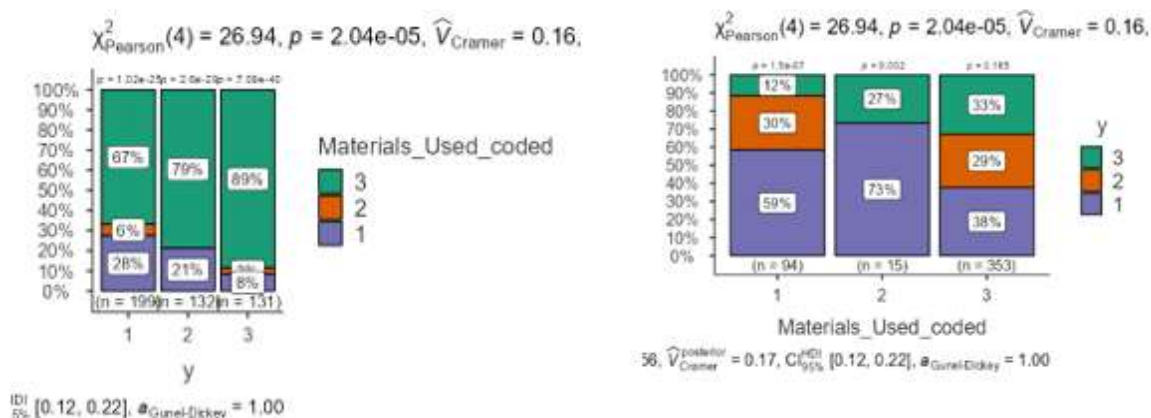
Materials Used coded	Counts	% of Total	Cumulative %
1	94	20.3 %	20.3 %
2	15	3.2 %	23.6 %
3	353	76.4 %	100.0 %



Observation – As per Table 7.9, the historic materials are used in only a handful of structures indicating many have vanished eventually. Most of the buildings have used modern materials and some significant number of temporary structures are also present.

To understand the level of change that have occurred in the studied buildings, a correlation model (Pearson co-efficient and Cramer's V) was studied to determine the Distribution of materials used over the years and how likely it has changed over the years.

Table: 7.10: Distribution of materials used according to y=1,2,3 and distribution of y according to materials used.



Observation - Table 7.10 represents that building with material type 2 which is historic is likely to have the least architectural changes. Building with material type 1 which is

temporary is likely to have medium architectural changes and building with material type 3 which is modern is likely to have high architectural changes.

7.5.6 Technology Used

This parameter was selected to identify the quantum of changes in construction technology across the surveyed buildings, in order to assess whether the impact of urbanization is directly proportional to the shift in building technologies.

This parameter represents the various kinds of technology and techniques used for construction of the identified structures as shown in Fig. 7.22, 7.23, and 7.24. The structures are classified into (1) Temporary category represents makeshift arrangements. (2) Load Bearing category represents structures built in traditional load bearing technology which was used before the propagation of RCC and steel structures. This category represents a mix of both historic and contemporary structures. (3) Column/framed technology represents structures built using RCC and



Fig. 22 -(1) Temporary



Fig. 23 -(2) Load bearing



Fig. 24 -(3) Framed

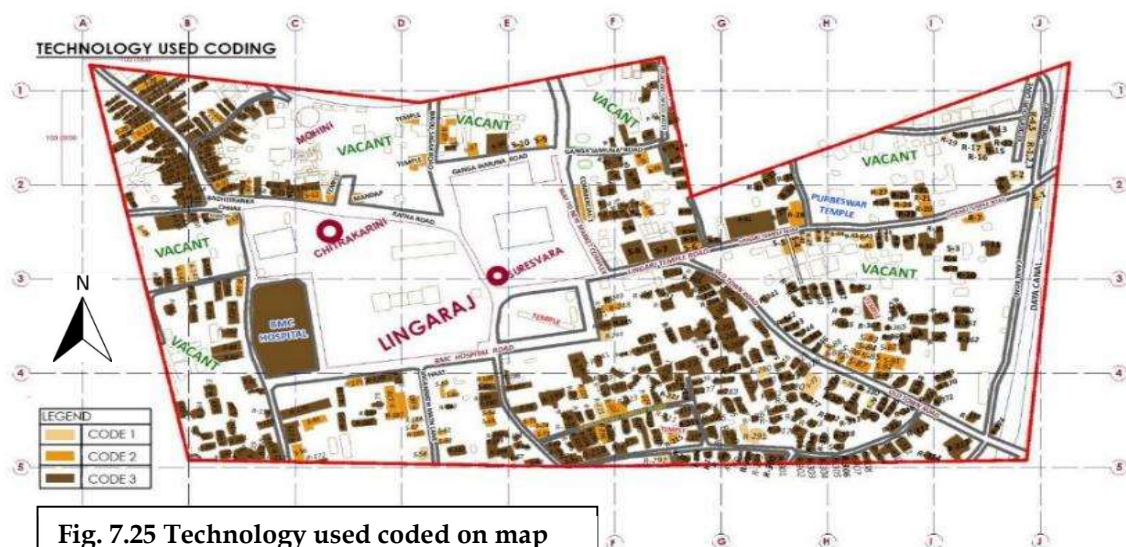


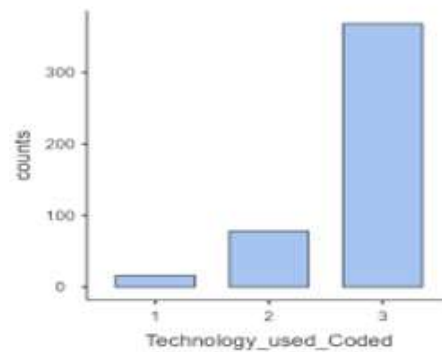
Fig. 7.25 Technology used coded on map

steel. This is the modern technology which represents modern era technologies. Fig. 7.25 represents the spread of technology used distributed on a map.

Table: 7.11: Technology used coded frequency distribution and bar chart

Frequencies of Technology used Coded

Technology used Coded	Counts	% of Total	Cumulative %
1	16	3.5 %	3.5 %
2	78	16.9 %	20.3 %
3	368	79.7 %	100.0 %



Observation - Based on the model given in Table 7.11, it is determined that major structures in the survey area have used column and framed structure technology. This is modernist and have undergone major/significant change from the traditional load bearing technology. This indicates that urbanization has severely affected traditional technology with almost 80% structures using column framed structure.

7.5.7 Ground Coverage

This parameter will help in understanding the change in building pattern which was relating it to urbanization. It is important to note that although ground coverage is categorized as above for exploratory analysis, while carrying out the ordinal



Fig. 7.26 -(1) 0-20%



Fig. 7.27 -(2) 20-50%



Fig. 7.28 -(3) 50% above

regression we incorporate them as the actual numerical values.

It analyses data of the ground area covered under construction with reference to the plot size. As represented in Fig. 7.26, 7.27, and 7.28, (1) 0-20% represents coverage of up to $1/5^{\text{th}}$ of the plot size. (2) 20%-50% represents buildings which cover up to half of the plot size. (3) 50% represents coverage above half of the plot area. The spread of ground cover is represented on a map in Fig. 7.29.

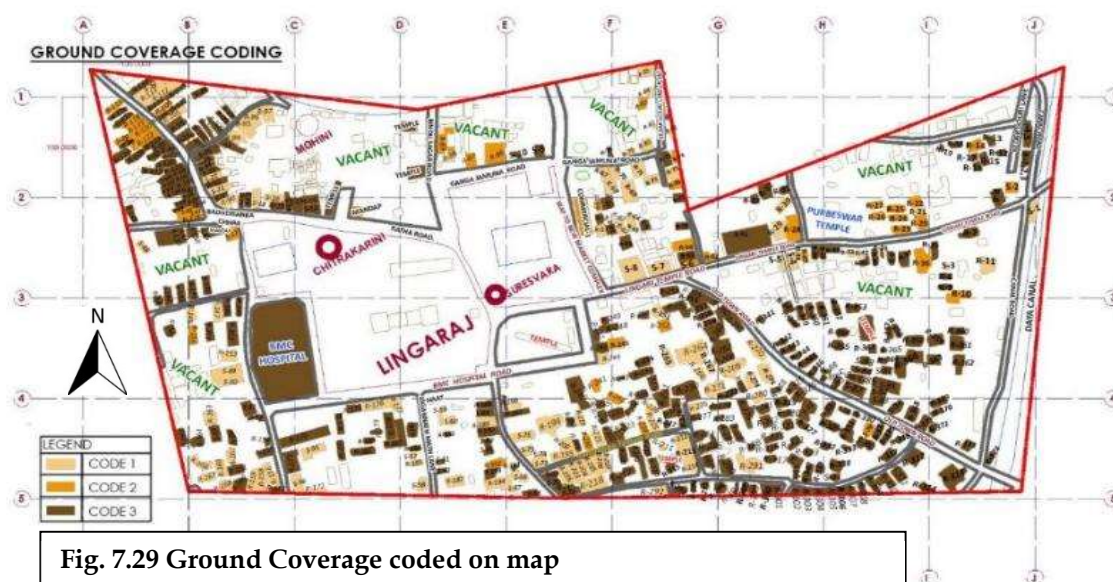
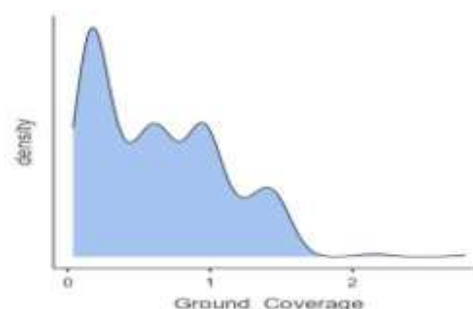


Fig. 7.29 Ground Coverage coded on map

Table: 7.12: Frequency distribution and density plot of ground coverage (x7) which is a ratio variable

Ground Coverage

N	462
Missing	0
Mean	0.637
Median	0.556
Standard Deviation	0.453
Minimum	0.0387
Maximum	2.78



Code .no.	Category	Counts
1	0-20%	142
2	20%-50%	53
3	50% & above	267

Observation - As per the analysis derived from Table 7.12, 57% of the houses have larger ground coverage indicating an adverse effect of urbanization. Buildings with less ground coverage have not been majorly affected by urbanization yet and are more likely to change with eventual urban progress.

7.5.8 Year of Construction

The construction year parameter will help in determining the factors which guided the construction. As represented in Fig. 7.30, 7.31 and 7.32, the classification are (1) Upto 1750 represents structures which were built before any major British intervention in Odisha wherein the traditional architecture was prevalent (2) 1750 - 1950 was predominantly the British era and any construction of this period had it's significant influence. (3) 1951 onwards represent the construction post the establishment of a new capital, transforming from temple city to capital city. It is



Fig. 7.30 -(1) Upto 1750



Fig. 7.31 -(2) 1750 - 1950



Fig. 7.32 -(3) 1951 onwards

important to note that year of construction is categorized as above for exploratory analysis, but for carrying out the ordinal regression we incorporate them as the actual numerical values of the year. Year of construction is also mapped as shown on Fig. 7.33.

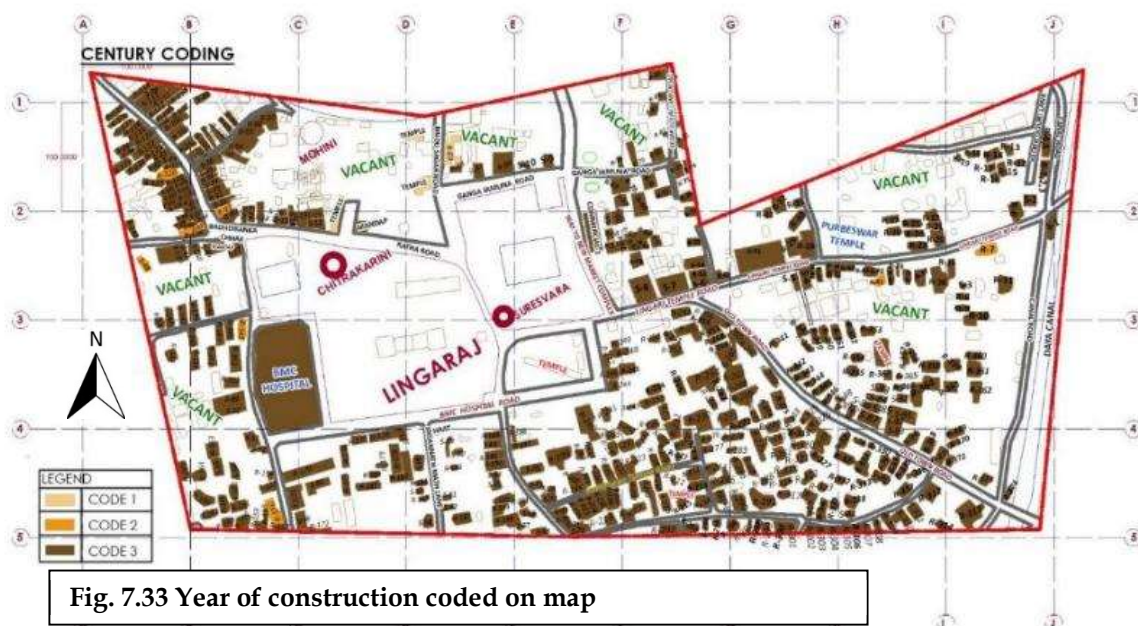
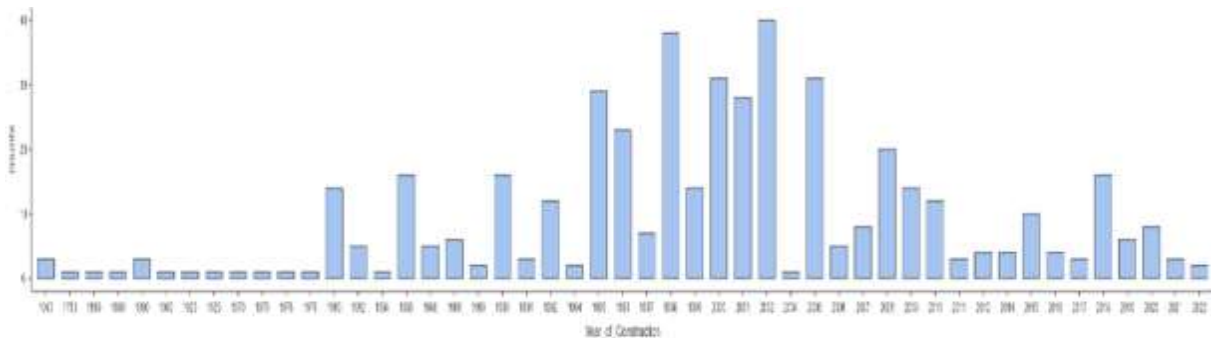


Fig. 7.33 Year of construction coded on map

Table: 7.13: Frequency distribution and bar chart of year of construction (x8) which is a ratio variable

Code .no.	Category	Counts
1	Up to 1750	4
2	1750-1950	8
3	1951 onwards	450



Observation - Based on Table 13, major construction have been undertaken since 1950. This is when the temple city transformed into capital city and urbanized rapidly. Only few remains of houses/structures built before 1950's remain.

7.5.9 Floor to Floor height

This parameter was selected to identify the changes in building construction styles which have been altered due to urbanization. It is important to note that although floor to floor height is categorized as above for exploratory analysis, while carrying out the ordinal regression we incorporate them as the actual numerical values in metres.

This parameter highlights the difference between floors in a building. As shown in Fig. 7.34, 7.35 and 7.36, case (1) Up to 3m represents modern houses built after 2000 (2) 3.1-6m represent middle aged structures which used to have greater heights as was



Fig. 7.34 -(1) Upto 3 mtr



Fig. 7.35 -(2) 3.1 to 6 m



Fig. 7.36 -(3) 6.1 m above

the trend of that period of construction. It also represents modern non-residential structures. (3) 6.1 & above represents older structures which had greater Floor to Floor heights - generally used in traditional houses, palatial buildings and temples. Fig. 7.37 represents this categorization on map.

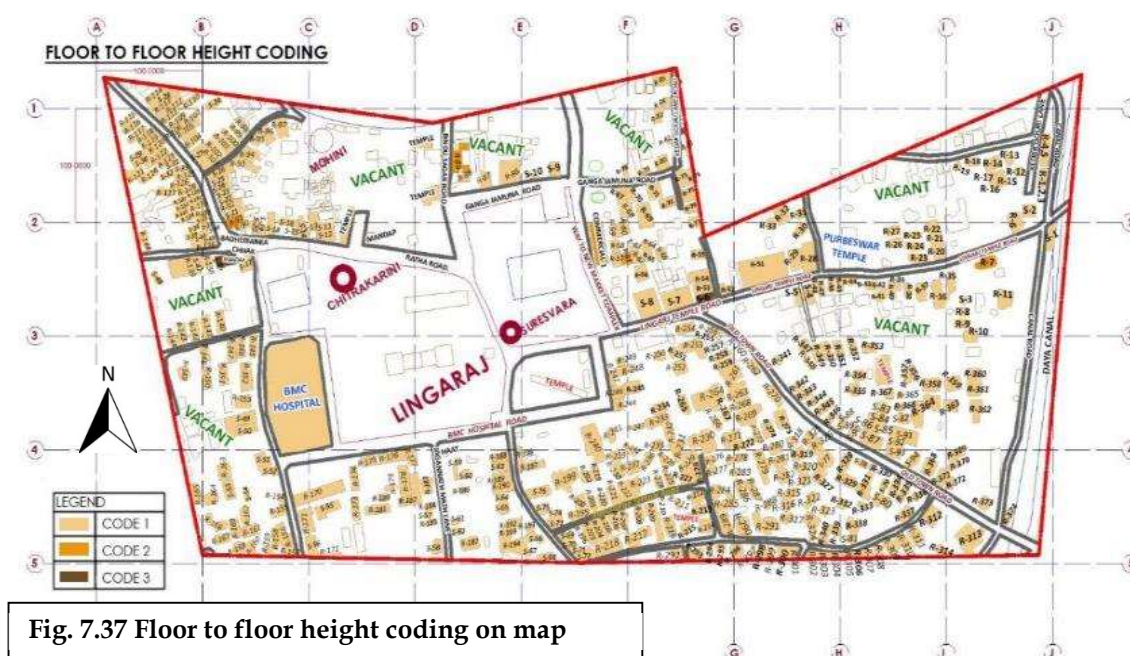
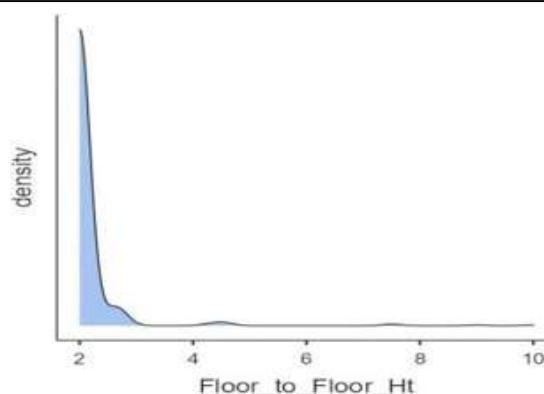


Table: 7.14: Frequency distribution and frequency density of floor to floor (x9) which is a ratio variable

Descriptives

Floor to Floor Ht

N	458
Missing	4
Mean	2.13
Median	2.00
Standard deviation	0.684
Minimum	2.00
Maximum	10.0



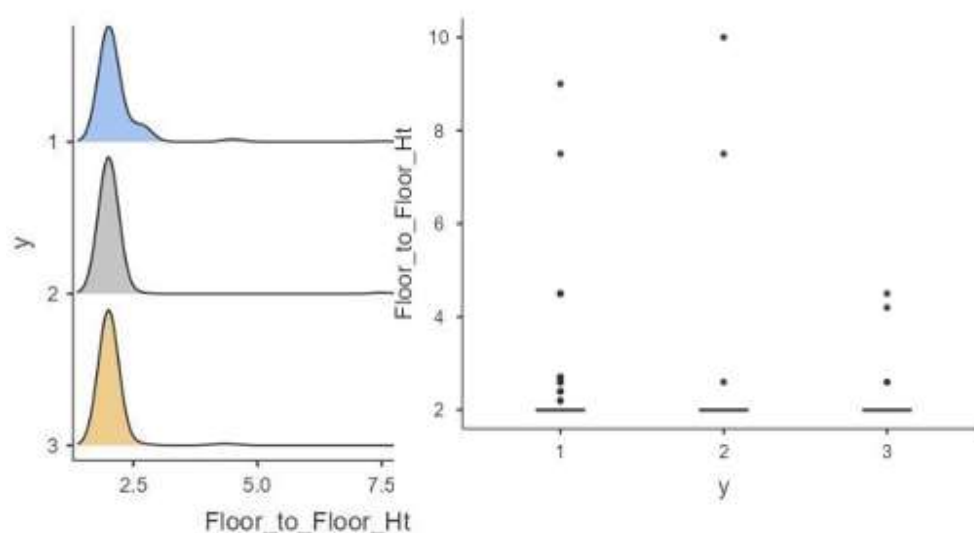
Observation - The graph in Table 7.14, 7.15 and 7.16 represents if floor to floor height increases then it is less likely to have architectural change and if floor to floor height decreases then it is more likely to have architectural changes. The ordinal regression model that we shall describe later suggests modern building with smaller floor to floor

Table: 7.15: Distribution of floor-to-floor height according to y=1,2,3.

Descriptives

	y	Floor to Floor Height		y	Floor to Floor Height
N	1	196	Median	1	2.00
	2	132		2	2.00
	3	130		3	2.00
Missing	1	3	Standard deviation	1	0.741
	2	0		2	0.843
	3	1		3	0.299
Mean	1	2.20	Minimum	1	2.00
	2	2.11		2	2.00
	3	2.05		3	2.00
			Maximum	1	9.00
				2	10.0
				3	4.50

Table: 7.16: Density plots and box-plots for floor-to-floor height of buildings falling in category 'y' =1, 2, 3



height are less likely to change since they have already been impacted. It is very likely that structures with greater floor to floor height will fall into the effects of urbanization and there will be a change in its character.

7.5.10 Plot Size

This parameter was selected to understand the eventual changes of the plot size with the advent of urbanization. As shown in Fig. 7.38, 7.39 and 7.40, case (1) 0-100sqm represent plots which have become small eventually due to division of land caused by urbanization. (2) 101-300sqm represents plots from the 20th century (3) 301 sqm & above represents older plots. Group housing plots can also be attributed to this



Fig. 7.38 -(1) 0-100 sqm



Fig. 7.39 -(2) 101-300 sqm



Fig. 7.40 -(3) 300 sqm above

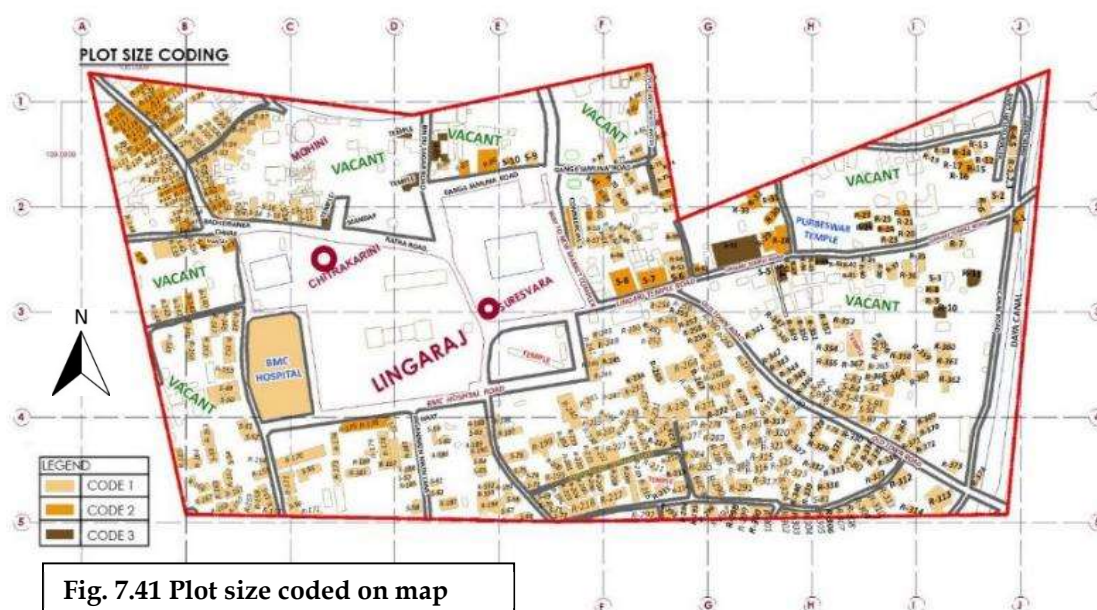


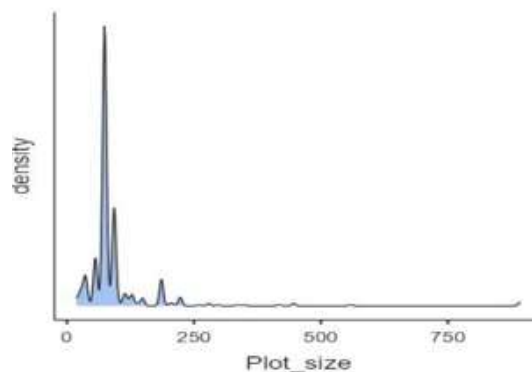
Fig. 7.41 Plot size coded on map

category. In the ordinal regression we incorporate plot size as the actual numerical values, and not as categories. Fig. 7.41 shows the classification on the site map.

Table: 7.17: Frequency distribution and frequency density of plot size (x10) which is a ratio variable

Descriptives

	Plot_size
N	462
Missing	0
Mean	95.2
Median	74.0
Standard deviation	86.1
Minimum	19
Maximum	892



Observation - From Table 7.17, it can be analysed that majority of the plots have eventually been divided into fragments. This is an outcome of rapid urbanization changing the original larger plots which would have been the original character of Ekamrakhstra. The bigger plots are highly likely to get further change or divided into smaller plots due to rapid urbanization.

7.5.11 Aspect Ratio

This parameter was selected to identify the quantum of changes in the aspect ratio of the surveyed buildings, in order to understand whether the impact of urbanization is directly proportional to the number of altered aspect ratios. In the ordinal regression we incorporate aspect ratio as the actual numerical value, and not as categories.



Fig. 7.42 -(1) Above 1

Fig. 7.43 -(2) 0.5 - 1

Fig. 7.44 -(3) less than 0.5

This parameter was selected to study the depth of the plot sizes with respect to its frontage. As shown in Fig. 7.42, 7.43 and 7.44, case (1) Above 1-represents plots which are older and thus have front width. (2) 0.5- 1-This represents plots which have undergone limited partitions. (3) less than 0.5-It represents plots which have been

affected by urbanization & population growth. Fig. 7.45 represents the aspect ratio earmarked on map.

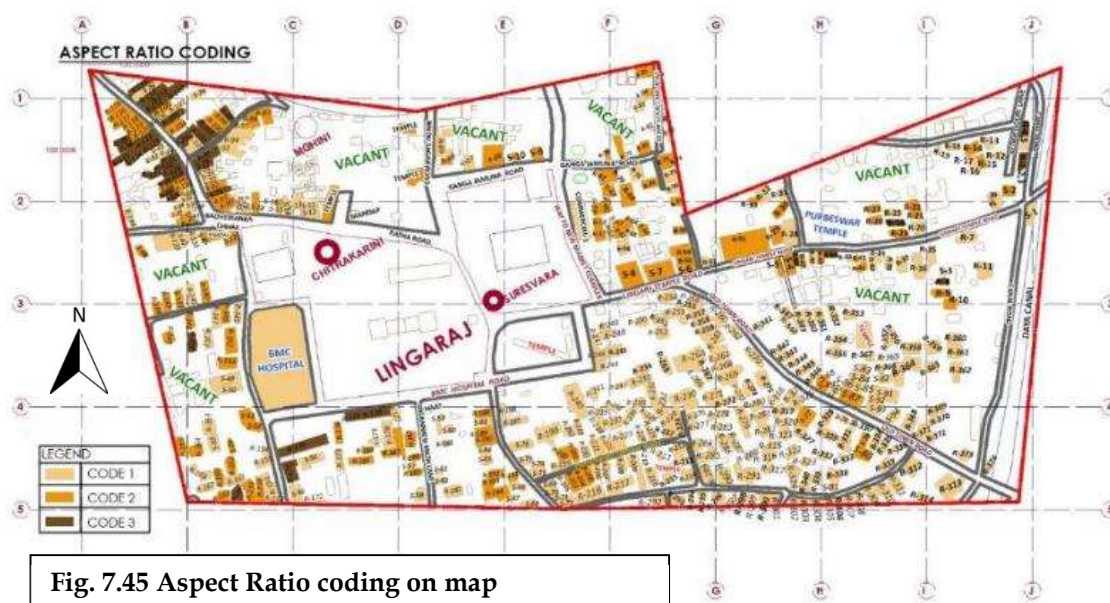
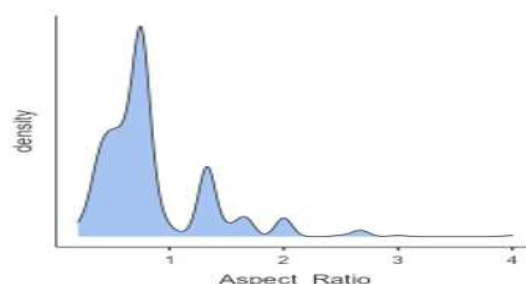


Table: 7.18: Frequency distribution and frequency density of aspect-ratio (x11) which is a ratio variable

Descriptives

	Aspect Ratio
N	462
Missing	0
Mean	0.851
Median	0.750
Standard deviation	0.483
Minimum	0.200
Maximum	4.00

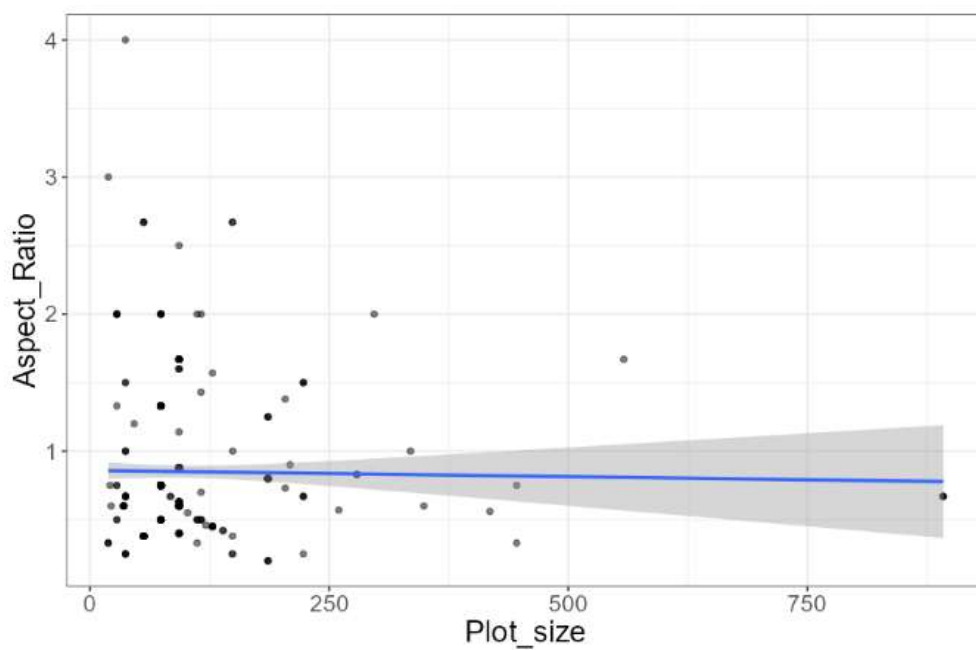


Code. no.	Category	Counts
1	Above 1	110
2	0.5 - 1	282
3	Less than 0.5	70

Observation – Table 7.18 suggests that aspect ratio of the plots have significantly changed from wider frontage to narrower frontage. This suggests division of plots in perpendicular to the access roads due to urbanization. There has been a noteworthy change in the original aspect ratio where the frontage of the plots would have been greater than the depth.

A linear regression as shown in Figure 7.46, in correlation with plot size was undertaken to determine any relationship of aspect ratio with plot size. The details of the findings are as below.

Figure: 7.46: Linear Regression of aspect ratio on plot size



Observation – Figure 7.45 suggests that there is no significant relation between plot size and aspect ratio as the correlation is weak. Thus, irrespective of the plot size, there has been a change in the aspect ratio. Ideally, the plot size and the aspect ratio should be inter-related in-case of a planned growth. This indicates there has been very little consideration of setbacks and offsets while the new buildings have been constructed. This shows a severe impact of urbanization.

7.5.12 Other Correlation models

Similar to the aspect ratio and plot size, there were other correlations which were also explored to analyse the inter-relationships between the parameters to determine the analyse and determine the effect of urbanization on the temple town of Ekamra Kshetra. Detailed analysis is outlined in the following matters.

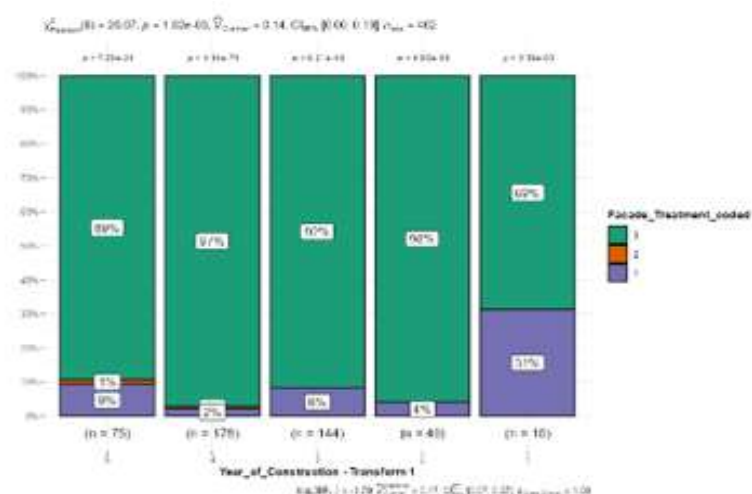
A. Façade treatment with the year of construction

To understand the change in the façade over the centuries or specifically the façade treatment before and after the creation of the capital city, there was a correlation model created to analyse the change.

To determine this, the year of construction was categorized into 5 categories 1040-1979 1; 1980-1989 2; 1990-1999 3; 2000-2009 4; 2009-2022 5.

As shown in Table 7.19, we checked how the facade treatment type changes along the different year of construction categories 1,2,3,4 and 5.

Table: 7.19: Correlation of façade treatment with year of construction



Contingency Tables

Facade_Treatment_coded	Year_of_Construction - Transform 1					Total
	5	4	3	2	1	
1	7	4	12	2	5	30
2	1	1	0	0	0	2
3	67	173	132	47	11	430
Total	75	178	144	49	16	462

Observation – As evident from the Table 7.19 contingency tables, façade treatment has been directly affected by the year of construction. There is a significant change to the category 1 façade – classical façade (31%). This trend developed majorly since the 1980s when industrial growth commenced in Odisha and Bhubaneswar gained attention with opening of offices in Odisha.

Table 7.20: Summary of variables

Variable	Symb ol	Description	Unit/scale of measurement	Highest level of change (%)
<i>Dependent Variable - Change in built heritage</i>	Y	The likelihood of modification made in each building surveyed	Measurement converted into ordinal values	
<i>Building height</i>	X1	Height of the building surveyed	Upto 3 metres, 3.1 to 6metres, 6.1 and above	43.1%
<i>Storeys</i>	X2	The number of storeyes of each building	Ground, G+1, G+2 or more.	64.9%
<i>Façade treatment</i>	X3	Description of the nature of façade treatment	Classic, colonial, contemporary.	93.1%
<i>Type of building</i>	X4	The nature of the use of the building	Residential, Commercial, Mixed.	72.7%
<i>Material Used</i>	X5	Variety of material used	Temporary, historic, modern.	76.4%
<i>Technology Used</i>	X6	Technology used for construction of the building	Temporary, load bearing, framed.	79.7%
<i>Ground Coverage</i>	X7	Coverage of ground by the building in respect to the plot size	Percentage.	57.7%
<i>Year of Construction</i>	X8	Depicts the tentative year of construction of the building	Upto 1750, 1750 - 1950, 1951 onwards.	97.4%
<i>Floor to floor height</i>	X9	Depicts the height of each floor.	Upto 3 metres, 3.1 to 6metres, 6.1 and above.	42.4%
<i>Plot Size</i>	X10	Describes the area of each plot	Upto 100 sqm, 101 - 300 sqm, 301 sqm and above.	28.6%
<i>Aspect Ratio</i>	X11	The proportion of width of the plot to the depth of the plot	Above 1, 0.5 to 1, less than 0.5.	50.75%

7.6 Key Findings from the model analysis

The analyses undertaken for the determination of change in the selected eleven parameters have highlighted the following key findings:

1. Façade treatment have been the major change as a result of urbanization. The facades have changed drastically to contemporary as against the classical style. The facades have either been largely altered or the old buildings have been

demolished to give way for newer construction with modern facades to accommodate family division and number of members. This can also be related to the year of construction which depicts a significant increase due to urbanization in later years, majorly after the 1980s. The building height has increased with the growth of population and increase in the family size.

2. The technology used for construction of structures have eventually changed over the centuries. Local bricks, stones, clay tiles have eventually been replaced with modern materials such as cement blocks, RCC and steel. This has majorly affected the holistic appearance of the structures along the access road making the spatial appearance clumsy and confusing. The visual sanctity of the space is lost to a great extent.
3. The buildings would have historically developed as residences, some shops and also some rest shelters for the pilgrims – dharamshalas. These would have been built with wide frontage as compared to the depth for visibility with ample setbacks to allow proper lighting and ventilation which suits best for the climatic conditions of the space. However, with the advent of urbanization and population splurge, the nature of use of the structures have been largely altered. Many of these structures, as evident have been either demolished or renovated with modern interventions changing the profile of the buildings. Shops and residences have been developed together in a building. Generally the shops are in the ground floor and the residences are made on the upper floors. These upper floor residences too have been commercialised either for rental purposes or for tourist residences. Greed of the owners to get maximum have changed the use of the buildings with no setbacks, making it often uncomfortable for living.
4. The road width have no relation to the height of the buildings. Clearly there is either violation of building bye-laws or un-precedented approvals have been acquired through unfair means for vertical growth of the buildings.
5. Most of the buildings surveyed are residential buildings. This indicates the strong connection between the temple and the settlements nearby which still exists. However, this is also a visible change being observed with increase in

mixed use buildings which is a part of sustainability for the local residents who are not associated with any other profession.

6. Use of materials for construction has eventually changed from historic to modern. Bricks, stones are being replaced with cement blocks, steel and glass. This poses a serious threat to the micro-climate of the space making it hotter and compelling use of artificial ventilation methods which further deteriorate the climate.
7. Traditional building technology have given way to modern construction techniques erasing the traditional features and thus affecting the façade of the building.
8. Most of the structures are built in the plot with little respect of the plot size and there is no consideration of aspect ratio, i.e., the width of the building to the depth of the building. As evident in one of the 18th century structures, these would have been otherwise. The gradual change is due to increase in population in the area and lack of any guideline for protection of the historic fabric.

Table 7.21: Linkage of the key findings to socio-economic factors and planning policy/implications:

<i>Key Finding Line</i>	<i>Socio-Economic Factor(s)</i>	<i>Planning Policy/ Implication</i>
1. Façade treatment... (contemporary style, demolition of old, increased height, post-1980s increase, family division/size)	Increased population, family division leading to need for multiple units, desire for modern aesthetics over classical/traditional.	Need for zoning/building codes to regulate height/density, need for Architectural Control Guidelines (ACG) in historic areas, Inadequate preservation policies for old buildings.
2. The technology used... (Local materials replaced by cement, RCC, steel; messy/clumsy spatial appearance)	Cost and Efficiency: Modern materials (RCC, steel) are often cheaper/faster than traditional skilled labor/materials. Lack of appreciation for traditional aesthetics/visual sanctity.	Failure of current building material regulations to promote/mandate the use of traditional or contextually appropriate materials, Lack

		of holistic urban design control along key roads.
3. Buildings would have historically developed as residences, shops and dharamshalas... (Wide frontage, setbacks vs. Modern mixed-use, no setbacks, commercialization, rental/tourist use, greed for maximum gain)	Economic Demand/Gentrification: Population splurge, tourism, commercial pressure for ground-floor shops, owner greed (maximizing return/profit) from rental/tourist use.	Failure of Land Use Zoning (or its enforcement) to control commercial creep into residential areas, Lax Building Bye-laws regarding setbacks, Lack of specific policies for historic mixed-use development and regulating tourism accommodations.
4. The road width have no relation to the height of the buildings... (Violation of bye-laws or unfair approvals)	Corruption/Circumvention: The demand for vertical growth due to high land value, coupled with willingness to violate rules or seek unfair approvals (bribery/malpractice).	Weak enforcement of existing Building Bye-laws (e.g., FAR/FSI tied to road width), Lax approval process and need for greater transparency in granting building permits.
5. Most of the buildings surveyed are residential... (Strong temple connection) However, increase in mixed use buildings... (sustainability for local residents who are not associated with any other profession)	Economic Diversification: Local residents seeking alternate livelihood beyond traditional means (e.g., temple service) through small businesses integrated into their homes.	Need for supportive mixed-use zoning that is sensitive to the residential character, but permits small-scale local commerce (a policy to enable sustainable local economies).
6. Use of materials for construction has eventually changed... (Bricks/stones replaced by cement blocks, steel, glass, micro-climate threat, need for AC)	Climate Change/Energy: Increased use of materials that retain heat (cement/glass) resulting in a deteriorated micro-climate and higher energy consumption for cooling.	Failure to integrate Sustainable Building/Green Building Codes that mandate climatically appropriate materials, Lack of policy promoting traditional, low-energy building techniques.
8. Most of the structures are built in the plot with	Population Growth/Land Pressure: Increased population	Absence of specific Heritage/Conservation

little respect of the plot size and there is no consideration of aspect ratio... (Gradual change due to population increase and lack of any guideline for protection of the historic fabric)	density leading to development that maximizes covered area, lack of value placed on traditional spatial planning (aspect ratio, courtyards).	Guidelines defining acceptable plot usage, setbacks, and traditional aspects; Need for stronger site coverage and density controls that respect historic patterns.
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The findings of the study strongly suggests a transitional model because they document the shift:

1. **From Classical to Contemporary:** (Façade treatment, Finding 1)
2. **From Traditional to Modern Materials:** (Local bricks/stones to cement/RCC/steel, Findings 2 & 6)
3. **From Original Use to Mixed/Commercial Use:** (Residences/dharamshalas to shops/rental/tourist, Finding 3 & 5)
4. **From Planned/Climatic to Unregulated/Maximum Gain:** (Wide frontage/setbacks/aspect ratio to no setbacks/vertical growth/plot disregard, Findings 3, 4 & 8)

This model illustrates the area moving away from its historical equilibrium toward a new, often denser and less regulated, modern urban form.

7.7 Conclusion

The aim of this research is to understand and evaluate the impact of the present urbanization happening on the morphological characteristics in the temple towns of Odisha. The objectives of the research is to enhance the understanding of the following:(A)To understand the evolution pattern of the historic towns of Odisha.(B)To assess and analyse the impact of present urbanizations happening in the temple towns. Through the course of this study, each of the above objectives has been thoroughly explored and addressed. The research has attempted to trace the historic growth patterns of temple towns in Odisha, offering insights into their traditional urban forms. Additionally, it has critically assessed the present-day urbanization

trends and their tangible and intangible impacts on the urban morphology, thereby fulfilling the core aim of the study. All of these have been fulfilled in the study undertaken. Analysis of each of the parameter has ascertained the level of damage on the original fabric of the locality. Several other parameters such as change in occupancy, Land value, change in movement of circulation, etc also could have been undertaken. All of these would have required further detailed investigation and critical observation at site, demanding significant time, which was not possible currently. These researches can be undertaken at a later stage and may form a larger study analysis of the given area to complete a holistic study of the effects of urbanization in Ekamra Kshetra. Pilot project may be established to assess an effective and practical solution for the key issues identified. It will also be helpful to determine the steps required to ensure either reversal of the damage or restrict the damage to its current state. Based on these findings, there is need for development of adequate guidelines which are holistic in nature and also offer sustainable solutions to the current problems. The guidelines thus developed shall also have effectively implemented on the ground rather than a hogwash as has been the cases in many of the cities in India. Greater co-ordination amongst all the urban development authorities is needed to ascertain a model conservation and urban renewal of this area, for this study and analysis can form the basis.

7.8 References

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8. Concluding Remarks

8.1 Introduction

As informed in the earlier Chapters, a detailed in-depth analysis of the morphological study was undertaken to study the impact of urbanization on the historic morphology of temple towns in Odisha. This included identification of similar earlier works which ranged from journals and books that have helped in the identification of the significant historic towns in Odisha. As mentioned, Cuttack, Bhubaneswar, Puri, Konark, Jajpur, Ganjam and Sambalpur are the urban centres which have also been the historic settlements that have shaped the culture and morphology of the region. All of these cities in Odisha have been closely associated with industrialization and urbanization in various aspects.

Cuttack formed in 10th century AD as a military town (Fergusson, 1910) eventually progressed to become the capital. Owing to its geography, being surrounded by mighty rivers, it was chosen as the capital of Utkala and remained as capital till independence of India. It was only post-independence when the demand for larger space led to the formation of a new capital town adjacent to the historic settlement of Bhubaneswar – the 2nd planned city of independent India. (Seymour, 1980). Puri, the land of Jagannath revolves around the same of culture, with the temple being at the cynosure of all the development of the centuries. It has remained as a pilgrimage and this religious town had always maintained its urban morphology. Even the British respected its nature and the urban centre remained as a district headquarter with major activities revolving around the Jagannath Temple. Urbanization in modern times has often challenged this morphology with unscrupulous developments in the later 20th century and the risk of loss still looms at large in this town. Konark has been a sleepy town lost over the centuries to the vagaries of nature with little or no remains of any historic urban centre, except for the ruins of the Sun temple. Jajpur and Sambalpur have urbanized into major industrial centres. Jajpur faced the wraths of Muslim invaders who destroyed the historic morphology and religious sanctity – the temples and related settlements (Fergusson, 1910). Temples were ravaged and the original historic identity of the town has been altered to a great extent with mosques

built from the ruins of temples (Fergusson, 1910). Today, except for the main temple of Viraja, the Viraj nagari (current Jajpur), historic structures such as lakes, temples, tanks and urban centres are either in perilous state or have vanished on total. Now, the city has rapidly changed into a modern town. Similarly, Sambalpur – once the seat of power of 'atharah gadhas' or eighteen fort settlements or kingdoms, hardly has any remains of it. Except for some remnants of the palace, the Samleswari temple and a small part of fortification, there are no traces of the glorious past that the city had during the reign of the Chauhans in the 16th century AD (Mishra, B. 2012). Bhubaneswar, the temple town still has significant remains of its historic morphology. The old town of Bhubaneswar still holds many temples, tanks and other religious structures that are evidence of the historic urban ensemble which evolved through the centuries. Temples were synchronous to settlements and thus the stages of development of the historic city can easily be mapped. This settlement escaped the wrath of Muslims owing to the thick forest cover which existed around it (Fergusson, 1910) and thus the temples are still evident. The sleepy temple town of Bhubaneswar was set to change as the newest planned city in 1951 when it was selected as the capital town of Odisha (Seymour, 1980). Then, the urban planners and architects had clear vision of not inter-twining the new and the old city (Mishra, S. 1989) and thus developed a separate new capital complex. However, with the eventual growth towards the end of 20th century there was a significant inflow of migrants from various parts of the state to the capital leading severe load on the existing urban infrastructure (Mishra, S. 1989). This led to an unscrupulous amalgamation of the historic and modern fabric challenging the original urban morphology. Bhubaneswar presents a classic example for the cause of the study of urban morphology of historic town in Odisha.

The Ekamra Kshetra – a settlement originated in the 12th century, which contained the Lingaraj Temple, Bindusagar and other significant temples was chosen as the study area. An area covering over 3 lakhs square metres, encircling four significant temples – the Lingaraj, Chitrakarini, Mohini and Suresvara was considered for a detailed visual site survey. Parameters of morphology were shortlisted and accordingly a set

of analytical questions was prepared for the survey. To further corroborate the study, a set of questionnaire was prepared for response from various users which included users, residents and subject matter experts.

Following the completion of the detailed visual survey of populated area, the inputs were carefully studied and outcomes were analysed to demarcate, highlight the key issues which needs to be addressed. Similarly, the response forms of the users in the area, experts and some tourists were also analysed to determine the key issues which are outcome of development in the area.

8.2. Key Aspects of Study:

The physical, social, and economic fabric of an area is significantly influenced by its development patterns and public infrastructure. By carefully assessing these elements, urban planners and policymakers can make informed decisions to guide the city's growth and evolution. Key Aspects of Urban Analysis which form the core of this study include:

1. Land Use Patterns:

- Residential: The distribution and density of residential areas, including housing types and affordability.
- Commercial: The location and concentration of commercial activities, such as retail, office, and industrial zones.
- Industrial: The spatial arrangement of industrial areas, considering factors like pollution, noise, and traffic.
- Green Spaces: The availability and quality of parks, green belts, and recreational areas.
- Circulation Areas: Availability of pathways for various kinds of movement.
- Public spaces: Spaces used for public gatherings. This area being flocked by pilgrims, the availability of public spaces for gatherings.

2. Transportation Network:

- Road Infrastructure: The efficiency and connectivity of road networks, including highways, arterial roads, and local streets.
- Public Transport: The availability and accessibility of public transportation options like buses, trains, and metro systems.
- Non-Motorized Transport: The provision of facilities for walking and cycling.

3. Parking Availability and Accessibility:

- On-Street Parking: The availability of parking spaces on streets.
- Off-Street Parking: The availability of parking garages and lots.
- Parking Management Strategies: Policies and regulations to manage parking demand and reduce congestion.

4. Public Infrastructure:

- Water Supply: The adequacy and reliability of water supply systems.
- Sewerage and Sanitation: The effectiveness of sewage treatment and disposal systems.
- Solid Waste Management: The efficiency of waste collection and disposal practices.
- Education: The availability and quality of schools and educational institutions.
- Healthcare: The accessibility and quality of healthcare facilities.

5. Settlements:

- Nature of settlements: Various classification of the existing settlements. This includes the kinds of structures – pucca, kuccha, semi pucca, etc.
- History of settlements: Analyse when these structures have been upgraded or built upon in the latest pattern.

6. Imageability and spatial characteristics:

- Presence of open spaces – courtyards, plazas, public places
- Presence of major landscape features – parks, green areas
- Presence of historic building façade
- Presence of modern style building façade
- Presence of similar looking buildings (homogeneous)
- Presence of outdoor dining
- Presence of mass gathering spaces
- Presence of sacred buildings
- Presence of informal activities
- Proper storm water drainage
- Presence of windows
- Presence of big shady trees
- Adequate facility for access of disabled
- Easy availability of public transport
- Restricted movement of vehicles in daytime for traffic management

7. Prominent activities that occur on the area and their effect.

8. Views and vistas related to the streets and important religious structures in the area.

9. Affect on the user's lifestyle owing the recent developments.

10. Opted resolution from the point of a common man who has been using this space.

By analysing these elements, the study have been able to identify strengths, weaknesses, and opportunities to optimize the historic city's development. This knowledge will inform decisions about zoning regulations, transportation policies, and infrastructure investments, ultimately shaping the city's future and improving the quality of life for its residents.

8.3. Key Outcomes – problems identified and possible solutions

The visual survey and the response from users and experts have highlighted the following:

- A. There has been a major transformation of the Ekamra Kshetra – falling prey to modern development. Original historic fabric has been lost in most of the places. However, there some handful of structures from the early 19th century which still have remains of the architectural facades which describes the typology of the structures that would have existed in this area. The mixed land-use of the area owing to the tourist inflow has certainly given rise to short term modern development which have rather affected the imageability of the location. There is a need for development of an appropriate façade which further accentuates the views of historic structures, rather than displeasing the sight. An urban arts commission on lines of the Delhi Urban Arts Commission may be developed here as part of the urban local body to govern the developments in the Ekamra Kshetra area.
- B. Infrastructure growth has been highly unscrupulous with ad-hoc thoughts, mostly developed in part to whole. This has led to non-sustainable solutions which have failed in after a couple of years. There is a need for an overall development plan of the entire Ekamra Kshetra – with delineation of its boundaries and preparation of a comprehensive development plan of this particular area. The plan should contain a well-defined heritage development plan of the area which should include all the scopes such as development of a detailed inventory of historic structures with set boundaries, conservation plan for each of the structures identified, an appropriate landscape around the structures, well designed streets and approaches which should not contrast or compete with the grandeur of the monuments, specific usage of the land available, imposition of public infrastructure such as water supply, sanitation, public convenience etc, waste disposal/recycling plan, water conservation, illumination of monuments, streets etc, effective plantation and other similar specifics in concurrence with the United Nations Sustainable Development Goals (UNSDG).
- C. As answered by many of the resident respondents, they have an affection attached to this place and are unwilling to move to other places for rehabilitation. Affection can be attributed to religious attachment, source of livelihood and thus rehabilitation to other areas will have adverse effects on the residents. There is a

need to determine solutions within the Ekamra Kshetra area itself. One possible solution is alternative design of housing which may be provided in a manner that open spaces are created for public usage. This can also be exercised as future development initiatives.

- D. The current movement pattern in the Ekamra Kshetra is highly unorganized and there is a need for greater controlled movement in this area. Several restrictions have to be adopted in policy for movement of vehicles and pedestrians. At the same time, it would be critical to understand that pedestrian movement in this area is guided through a course of activities which occur in this area. Thus, a concerted effort has to be implied on the movement of various vehicles in this area – time wise, need wise and activity wise. This has to be regulated at regular intervals to ensure effective implementation.

Table 8.1: Linking the key findings to sustainable urban form principles and sustainable solutions

Key Finding (Line)	Sustainable Urban Form Principle	Connection to Sustainability
Infrastructure growth has been highly unscrupulous... (Need for overall development plan, heritage development plan, waste disposal/recycling plan, water conservation, concurrence with UNSDG.)	Integrated Planning & Resource Efficiency (The core of sustainability)	Ad-hoc development is inherently unsustainable. The need for a comprehensive plan, waste management, and water conservation directly aligns with UNSDG goals for environmental and resource sustainability.
Affection attached to this place... unwilling to move... (Need for solutions within the Ekamra Kshetra; alternative design of housing to create open spaces.)	Social Sustainability & Compact, Mixed-Use Design	Respecting resident attachment (social sustainability) while seeking design solutions (alternative housing) to increase open spaces and density (compact form) addresses both social equity and efficient land use.

Current movement pattern is highly unorganized... (Need for greater controlled movement, restrictions for vehicles, prioritizing pedestrian movement guided by activities.)	Sustainable Transport / Transit-Oriented Development (TOD)	Reducing vehicle dominance and prioritizing controlled/pedestrian movement minimizes air pollution, noise, and energy use while promoting a healthier, more livable, and socially engaging urban environment.
Short term modern development... (Affecting imageability, need for appropriate façade to accentuate historic views, Urban Arts Commission.)	Architectural Control & Quality of Place	Controlling sprawl and ensuring new development respects the existing cultural/historic context preserves the identity, heritage, and visual quality of the place, contributing to the long-term resilience and attractiveness of the urban form.

8.4. Avenue for future studies

There is a need for further studies based on existing morphology and experiments have to be undertaken to determine an appropriate scheme of development. All the key outcomes and potential solutions discussed above can be undertaken separately for detailed investigation, adoption of a development scheme. One such area of intervention can be the development of a low-rise multi-housing scheme which plans to de-congest the area. A sample survey and implementation can be undertaken by agencies to determine its effectiveness. Another similar experiment can be on the traffic pattern where movements of various kinds of vehicles can be regulated along with the pedestrian movement. Detailed study for the need synchronised with movements can be assessed. Most critical avenue of indepth future study is the development of guidelines for heritage conservation and urban arts commission. This would need a detailed, thorough and elaborate study.

8.4.1 Broad guidelines recommended

Based on the initial carried out in this research, there are several other scopes or open ended questions which need to be answered to determine a holistic guideline for the development of the area. Some of the broad guiding areas of recommendations based can be based on the following heads:

1. **Historic & Spatial Continuity:** Strengthen the concept of Astayatanas - The concept of Astayatana which form the sacred geography of the area should be deciphered and its role enhanced both in plan and form, link temples as per sacred geography, strengthen the ritual path, enhancing commercial activities related to religious activity along the ritual routes. The symbolic values in the form of signs, symbols and motive should be expressed, spatial forms and their manifestations should be continued, hierarchy should be established in the scale of space that is grandest in the temples through public building to residences so that the dominant theme is established on the temples. The indigenous culture and rituals pertaining to the place should be given significance by strengthening age old art & craft and providing tourist & pilgrimage amenities.
2. **Environmental Upgradation:** Ecological integrity should be developed. One prime activity towards this is to chanelise the main drain, ensure balanced ecosystem and prevent 'Eutrophication' of the water bodies. Similarly physical integration, functional integration and visual integration should be undertaken to enhance the micro environment of the historic area.
3. **Local Economic Regeneration** through encouragement of handicraft sector, traditional construction materials, reuse of ashrams, controlled commercial activities and boosting tourism sector.
4. **Delineation of the core area:** Heritage zone significance can be ascribed to a collection of buildings, structures, sites, objects and space that processes integrity of location, design setting, materials, workmanship, feeling and association. Areas with linkages of buildings, structures, sites, objects and spaces, a majority of which continue to exist were first created in traditionally accepted relationship. The Ekamra Kshetra area extends to nearly 8 square kilometers but all of it is neither historic nor religious. Certain temple groups are engulfed by developments that

hinder implementation of conservation activities and operational problems. Areas have to be therefore delineated to achieve a systematic approach of study. The area around Lingaraj and Bindusagar becomes the central core. The intermediate core is around it, bounded by the railway line, Puri road, green belt and the hata (weekly informal market). Within the edges of the Heritage area, there are the temple groups of Rameswar, Kapileswar, Meghaswar, Brahmaswar, Nageswar and Shyameswar, and Vithal Deul which too have to be delineated. Such delineation would enable them to be a part of the Master plan planning zones, thereby giving the Heritage Area a legal status. The development of these areas can be monitored by different sets of guidelines covering architectural features, building volume, public amenities and traffic network. These delineations form the basis for the overall restructuring of the area.

5. Movement network: The area which has grown organically is now being forced to cope up with the present day demands and one of the main conflict point is the traffic, pilgrim and ritual movement. As a result, both the historic ambience and the urban clarity of the area are eroding. Scheme should propose to pedestrianise the central area only. A light vehicular loop road will surround the area, which acts as a feeder road for tourist, pilgrims and local people with 3 parking node at 3 direction of major entry point. A road parallel to Bindusagar road, one long Daya canal and another linking Mahatab road to the hospital are the three roads proposed to cater to the diverted traffic and to maintain points, occurring at all no entry spots of the vehicles are designed with sufficient parking area, as well as of the vehicles are designed with sufficient parking area as well as mechanisms to regulate vehicle road entry. General public amenities are also to be provided. Provisions are needed for tourist vehicle parking. In the central core area there are no car owners and residential lanes have to be provided for motorized two wheelers without affecting the pedestrian areas. Proposals should aim at not only organizing and improving the present linkages, but also at restructuring the whole area based on a comprehensive approach. It is also a preventive approach to take care of possible future traffic problems.

6. Tourist/pilgrim amenities: The area lacks proper infrastructure facility for pilgrims and tourists. Sulabh Suachalaya, drinking water points, Information Kiosks, solid waste disposal bins, signage etc to be provided at appropriate points. The Tourism Department have to carry out this project and can give 50% of return to temple trust for the benefit of sevakas and increase of temple economy.
7. Economic Generation: People working on handicraft sectors are scattered and within the residential colony. A well-defined handicrafts neighbourhood should be proposed to have art and craft centre. The area will accommodate both work centre and selling counter. An organization to be set up to establish sector for improving the training opportunities and marketing of the goods. This will boost the economy of craftpersons and revive the handicraft still the once made the town so famous.

8.4.2 Specific development guidelines

1. Lingaraj temple & surrounding redevelopment: Lingaraj Temple area is the focus of the heritage zone, unfortunately is the most crowded and unorganized area. With the increasing number of visitors, the pressure on the area is also increasing thereby seriously affecting its historic and religious qualities. The whole area is to be pedestrianised. The uninspiring fore front to the temple should have plazas, bazaars, shaded areas and clear visual lines. The northern part of the area should be opened out all the way to Bindusagar, providing a park and a heritage centre. While the local residents' needs will continue to be met by the roadside shops, those of the visitors can be met by the local economy. All these have been worked out in a mutually inter-related and integrated commensurate with the importance of this area. The organized shopping, provision of handicrafts and souvenir shops, increased public amenities and the enhancement of visual and urban design qualities are bound to attract more visitors, thus boosting the economy. Besides the increased quality of life and enhanced historic ambience.
2. Bindusagar tank redevelopment: Bindusagar tank is the most sacred and important tank of the heritage area with many untapped potentials for public public amenity. There have been ad-hoc attempts to develop its banks but now the need for a comprehensive scheme has been recognized. The area around the tank

up to the building line has been considered for development. The scheme should include public amenities like parks, playgrounds, changing rooms, restored and extended steps etc. The area to be pedestrianised should also be a part of the proposal.

3. Residences: Means of access - minimum width of access should be 3metres. Open spaces for road widths up to 3-6 metres. No front setback but small verandah of minimum 1metre wide should be compulsory. Well articulated openings can be insisted along with internal courtyard of minimum width as per building height should be compulsory. Rear open space of average 3 metres should be essential. Height of the residences should be limited to a maximum of 9 metres from the nearest road level, with a minimum floor to floor height of 3 metres. Ideally a plinth of 1 metre height should be provided. The basic building materials should be local stone. The façade has to be streamlined and homogenised to further accentuate the historic character of the space.

8.5. Conclusion

This in-depth study with the case analysis of Ekamra Kshetra will serve as a pilot project for similar works to be undertaken in historic towns of Odisha and India as well. This study clearly outlines the major drawbacks in the urban morphology of a temple town which determined the historic core. Understanding of the historic core initiates from the root – analysis of the historic development which here includes classification of the urban centres, origin of the settlement, history associated with it, reason for development of the settlement, changes in the fabric of the city owing to several reasons, any major historical timeline which has greatly affected the urban settlement – the transformation of temple city to capital city in the case of Bhubaneswar, population spurge etc. One major drawback of my study has been the lack of any historic images which would have been helpful in understanding the settlement before the great change. However, it is to be understood that Bhubaneswar was secluded from mainstream in the 17th century till the formation of the capital city and it is unlikely to have any archival images of the site. This may not be the case in

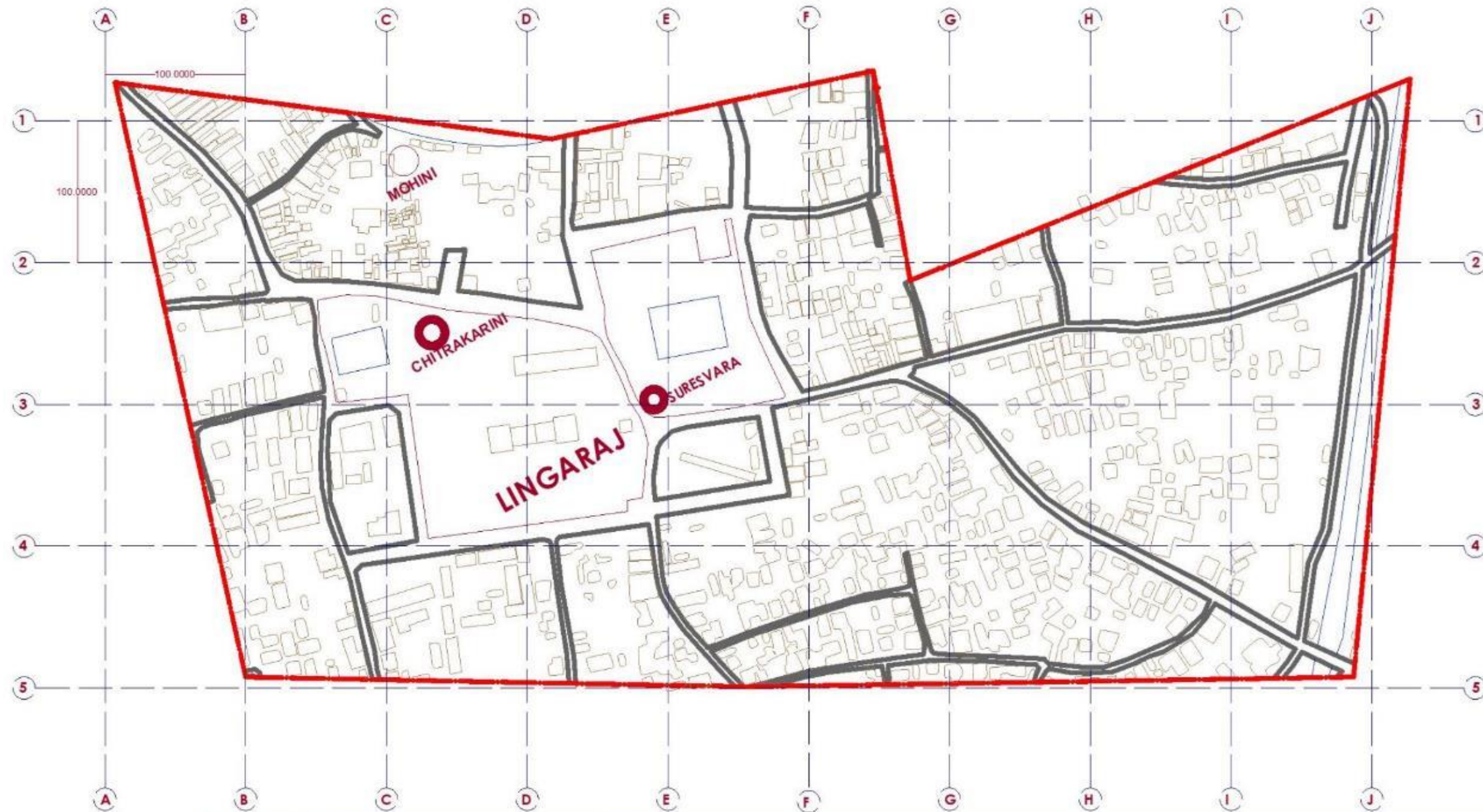
other popular cities both in Odisha as well as India. Old town in Bhubaneswar is driven by the Lingaraj culture which also attracts a lot of tourists to this place. Owing to this, there is still some connect of the old with the new. It is to be understood that in major portions of these historic towns, settlements are without proper documentation and thus extracting information from the subjects are not easy. The efforts undertaken in this study will be helpful for a sustainable development of a historic site and will be helpful in opening further avenues of research and experimentation on similar historic temple towns across the globe.

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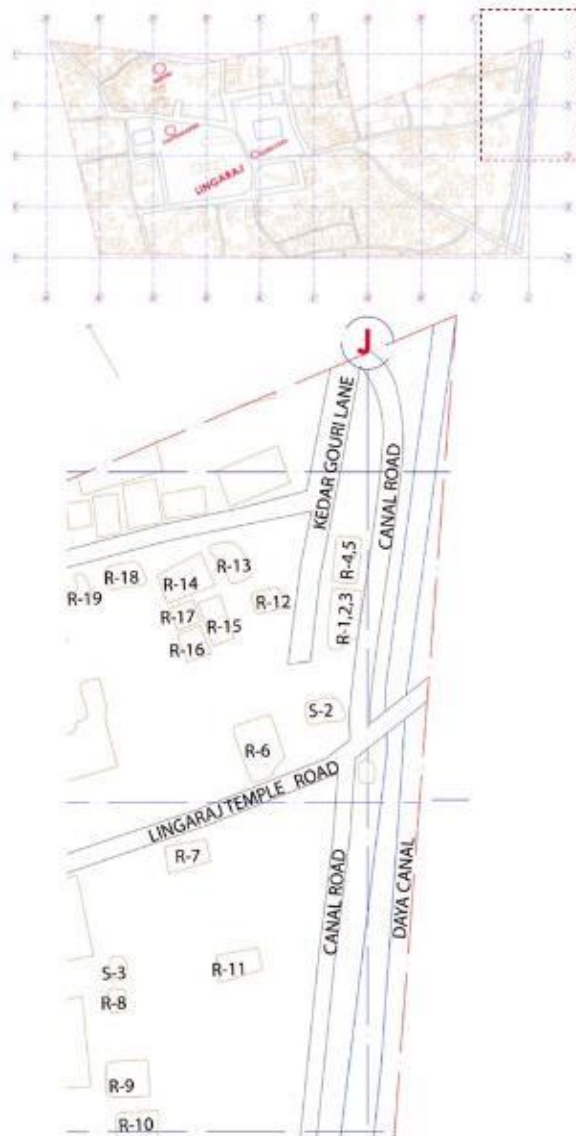
ANNEXURE A – Visual Survey of the selected area



Sl No	Details	Description
1	Total area of study	3,24,837 square metres or 80.26 acres
2	Area of protected Temple complex	Lingaraj & Chitrakarini – 26,618 sqm; Suresvara temple with tank – 12,336 sqm; Mohini temple – 354 sqm
3	Area of approach roads and pathways	33,716 square metres
4	Number of structures surveyed	476
5	Number of different structures surveyed	Residential/ Residence cum shop - 374; Shops – 93; Public facilities like temples, conveniences - 9

Fig 1: Map and details of the area selected for Survey.

Source: Self

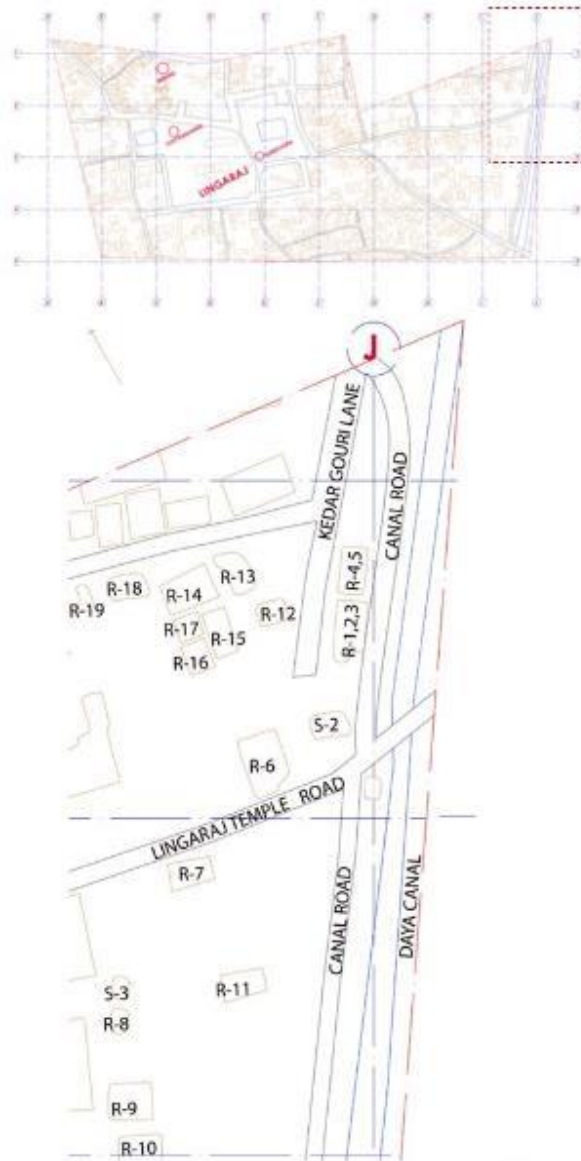


Parameters	Bldg S-1	Bldg S-2	Bldg R-1	Bldg R-2	Bldg R-3	Bldg R-4	Bldg R-5	Bldg R-6	Bldg R-7	Bldg R-8
1. Building Ht.	10'	9'0"	10'0"	10'0"	10'0"	8'0"	8'0"	20'0"	15'0"	22'0"
2. Facade Treatment	Temporary	Temporary	Temporary	Temporary	Temporary	Brick & Asbestos	Cement & Tile	Plastering	Plaster on walls, pitched tile roof	Plastering
3. Type of Bldg	Residential	Shop	Residential	Residential	Residential	Residential	Residential	Residential	Residential 9	Residential 10
4. Materials Used	Bamboo framing & sheet	Polythene & Brick exposed	Brick, Cement, Sand, Asbestos	Brick & Asbestos sheet	Asbestos & Polythene	Brick, Cement, Sand, Asbestos	Brick, Cement, Sand, Asbestos	Concrete, Plastering	Brick, Concrete, Sand, roof tiles	Concrete, Plastering
5. Technology used (Load Bearing or Column structure)	Temporary structure	Temporary structure	Temporary structure	Temporary structure	Temporary structure	Temporary structure	Temporary structure	Column structure	Load bearing	Column structure
6. Footprint	NA due to temporary nature of building	NA due to temporary nature of building	NA due to temporary nature of building	NA due to temporary nature of building	NA due to temporary nature of building	NA due to temporary nature of building	NA due to temporary nature of building	300 sqm	100 sqm	1500 sqm
7. Year of Construction	2018	2020	2017	2022	2016	2013	1999	2023	2012	2018
8. Floor to Floor Ht.	10'0"	9'0"	10'0"	10'0"	10'0"	8'0"	8'0"	10'0"	15'0"	10'0"
9. Plot size	50' x 25'	50' x 20'	20' x 50'	30' x 10'	NA	NA	NA	50' x 80'	50' x 30'	30' x 120'
10. Aspect Ratio (front width: side depth)	NA	NA	NA	NA	NA	NA	NA	1:1.6	1.8:1	NA
11. Any other observation						LIG	3 storey building			Group housing project



Fig 2: Details of Survey sheet 1

Source: Self

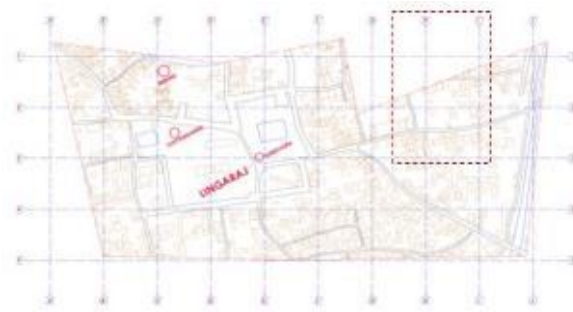


Parameters	Bldg R-9	Bldg R-10	Bldg R-11	Bldg R-12	Bldg R-13	Bldg R-14	Bldg R-15	Bldg R-16	Bldg R-17	Bldg R-18	Bldg R-19	Bldg S-3
1. Building Ht.	20'	20'0"	30'0"	20'0"	20'0"	30'0"	10'0"	10'0"	30'0"	22'0"	12'	12'
2. Facade Treatment	Concrete Cement structure	Concrete Cement structure	Concrete Cement structure	Concrete Cement structure	Concrete Cement structure	Concrete Cement structure	Temporary structure	Brick & Asbestos	Brick & Asbestos	Concrete Cement structure	Plaster & Asbestos	Plaster & Asbestos
3. Type of Bldg	Residential	Residential	Residential	Residential	Residential	Residential	Store	Residential	Residential	Residential	Residential	Shop
4. Materials Used	Brick, Cement, Sand, Concrete	Brick, Cement, Sand, Concrete	Brick, Cement, Sand, Concrete	Brick, Cement, Sand, Concrete	Brick, Cement, Sand, Concrete	Brick, Cement, Sand, Concrete	Brick, Concrete & Tiles	Brick, Cement, Sand, Asbestos	Brick, Concrete, Sand	Concrete, Plastering	Cement plaster	Cement plaster
5. Technology used (Load Bearing or Column structure)	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Temporary structure	Temporary structure	Column structure	Temporary structure	Temporary structure
6. Footprint	240 sqm	280 sqm	200 sqm	200 sqm	180 sqm	300 sqm	NA	NA	NA	350 sqm	NA	NA
7. Year of Construction	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
8. Floor to Floor Ht.	10'0"	10'0"	10'0"	10'0"	10'0"	10'0"	10'0"	10'0"	10'0"	10'0"	12'0"	12'0"
9. Plot size	30' x 50'	50' x 90'	60' x 60'	30' x 65'	30' x 60'	40' x 70'	30' x 60'	NA	NA	50' x 30'	NA	NA
10. Aspect Ratio (front width: side depth)	1:1.8	NA	1:1	1:2.2	1:2	1:1.75	1:2	NA	NA	1.6:1	NA	NA
11. Any other observation		Group housing					Store			Group housing project		



Fig 3: Details of Survey sheet 2

Source:

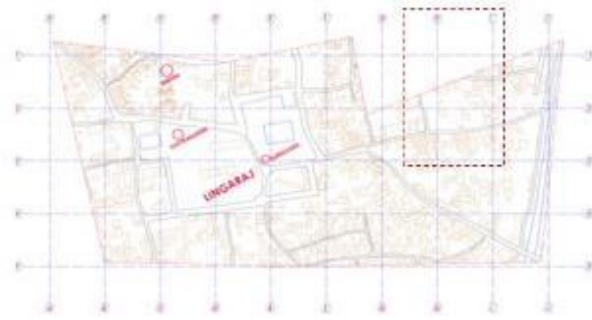


Parameters	R 20	R 21	R 22	R 23	R 24	R 25	R 26	R 27	R 28	R 29	R 30	R 31	R 32	R 33
1. Building Ht.	14'	20'	20'	24'	15'	25'	20'	15'	15'	15'	10'	10'	22'	30'
2. Facade Treatment	Plaster	Plaster	Plaster	Plaster	Plaster	Plaster	plaster	Exposed Bricks	Cement Plastering	Cement ,sand ,tile	Cement Plastering	Cement Plastering	Brick,Cement,Sand	Brick,cement,sand ,putty
3. Type of Bldng	Residential	Residential	Residential	Residential	Residential	Residential	Residential and shop	Residential	Residential	Hotel	Residential	Residential	Residential	Residential
4. Materials Used	Brick, Cement, Sand, Concrete	Brick, Cement, Sand, Concrete	Brick, Cement, Sand, Concrete	Brick, Cement, Sand, Concrete	Brick, Cement, Sand, Concrete	Brick, Cement, Sand, Concrete	Brick, Cement, Sand, Concrete	Brick, Cement, Sand, Concrete	Brick, Cement, Sand, Concrete	Brick, Cement, Sand, Concrete	Brick, Cement, Sand, Concrete	Brick,Sand, Cement	Cement,Sand,Brick	Brick,Cement,Plastering
5. Technology used (Load Bearing or Column structure)	Load bearing	Column structure	Column structure	Column structure	Load bearing	Column structure	Column structure	Load bearing	Load bearing	Column structure	Column structure	Load Bearing	Column Structure	Column Structure
6. Footprint	150 sqm	120 sqm	200 sqm	150 sqm	135 sqm	240 sqm	480 sqm	200 sqm	180 sqm	180 sqm	150 sqm	200 sqm	150 sqm	200 sqm
7. Year of Construction	2021	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
8. Floor to Floor Ht.	10'0"	10'0"	10'0"	10'0"	10'0"	10'0"	10'0"	11'0"	10'0"	15'0"	10'0"	10'0"	10'0"	10'0"
9. Plot size	50' x 30'	30' x 40'	40' x 50'	30' x 50'	25' x 50'	60' x 40'	60' x 80'	40' x 50'	60' x 30'	30' x 60'	40' x 50'	80' x 30'	50' x 35'	40' x 60'
10. Aspect Ratio (front width: side depth)	1.6:1	1:1.33	1:1.25	1:1.66	1:2	1.5:1	1:1.3	1.1.25	2:1	1:2	1:1.25	2.66:1	1.43:1	1:1.5
11. Any other observation	LIG													



Fig 4: Details of Survey sheet 3

Source: Self

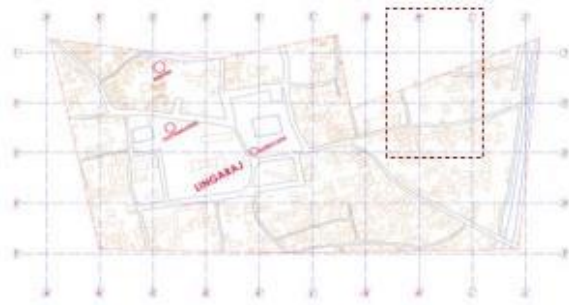


Parameters	R-34	R-35	R-36	R-37	R-38	R-39	R-40	R-41	R-42
1. Building Ht.	40'0"	22'0"	22'0"	22'0"	22'0"	20'0"	20'0"	9'0"	9'0"
2. Facade Treatment	wooden, cement, plastering	Tile, Cement, Sand, Brick	Cement Concrete	Cement Plastering	Cement Plastering	Cement Plastering	Cement Plastering	Exposed ricks	Exposed ricks
3. Type of Bldg	Residential	Commercial cum Residence	Residential	Residential	Residential	Residential	Residential	Residential (Chawl)	Residential
4. Materials Used	Brick, Sand, Cement	Cement, Sand, Brick	Cement & Tile	Brick, Sand, cement	Brick, Sand, cement	Brick, Sand, cement	Brick, Sand, cement	Brick, Sand, Asbestos	Asbestos, Sand, cement, brick
5. Technology used (Load Bearing or Column structure)	Load Bearing	Column Structure	Column Structure	Column Structure	Column Structure	Column Structure	Column Structure	Load Bearing	Load Bearing
6. Footprint	200 sqm	150 sqm	200 sqm	150 sqm	240 sqm	120 sqm	120 sqm	NA	NA
7. Year of Construction	2017-18	2018	2014	2009	2009-10	2008-09	2007-08	2006	2007-08
8. Floor to Floor Ht.	10'0"	10'0"	10'0"	10'0"	10'0"	10'0"	10'0"	9'0"	9'0"
9. Plot size	30' x 80'	30' x 50'	40' x 60'	50' x 30'	40' x 60'	20' x 40'	40' x 30'	NA	NA
10. Aspect Ratio (front width: side depth)	1:2.66	1:1.67	1:1.5	1.67:1	1:1.5	1:2	1.33:1	NA due to temporary nature of bldg	NA due to temporary nature of bldg
11. Any other observation									



Fig 5: Details of Survey sheet 4

Source: Self

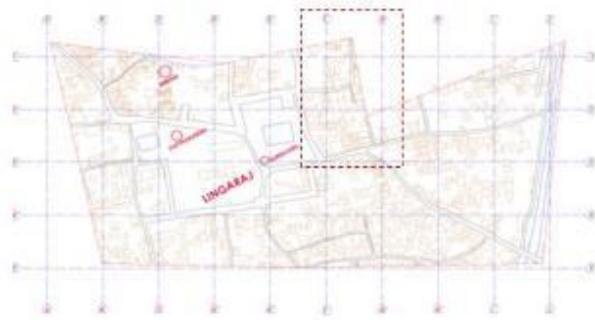


Parameters	R-43	R-44	R-45	R-46	R-47	R-48	S-4/R49	S-5/R50
1. Building Ht.	20'0"	10'0"	20'0"	9'0"	20'0"	30'0"	9'0"	9'0"
2. Facade Treatment	Cement, Plasterig, Colour, Putty colour	Cement, Plasterig, Putty colour	Cement, concrete	Cement Plastering	Cement, concrete	Cement Plasters, plaks	Cement Plastering	Cement Plastering
3. Type of Bldng	Residential	Residential	Residential	Residential	Residential	Residential	shop-4	shop-5
4. Materials Used	Brick, Sand, Cement	Brick, Sand, Cement	Brick, Sand, Cement	Brick, Sand, Cement	Brick, Sand, Cement	Brick, Sand, Cement	Abestos, Brick, Cement, sad	Abestos, Brick, Cement, sad
5. Technology used (Load Bearing or Column structure)	Column Structure	Column Structure	Column Structure	Load Bearing	Column Structure	Column Structure	Load Bearing	Load Bearing
6. Footprint	120 sqm	500 sqm	150 sqm	NA	200 sqm	60 sqm	24sqm	150 sqm
7. Year of Construction	2017-18	2009-10	2010-11	2009	2021	2020-21	2008-09	2007-2008
8. Floor to Floor Ht.	10'0"	10'0"	10'0"	9'0"	10'0"	10'0"	9'0"	9'0"
9. Plot size	40' x 30'	40' x 120'	30' x 50'	50' x 30'	40' x 50'	15' x 40'	12' x 20'	30' x 50'
10. Aspect Ratio (front width: side depth)	1.33:1	NA	1:1.66	NA due to temporary nature	1:1.25	1:2.67	1:1.67	1:1.67
11. Any other observation		Group housing						



Fig 6: Details of Survey sheet 5

Source: Self



Parameters	R-51	R-52	R-53	R-54	R-55	R-56	R-57	R-58	R-59	R-60	S-6	S-7	S-8
1. Building Ht.	20'0"	20'0"	30'0"	30'0"	20'0"	20'0"	30'0"	30'0"	20'0"	20'0"	20'0"	20'0"	20'0"
2. Facade Treatment	Cement, Plasterig	Cement, Plasterig	rick,Cement, Plasterig	Cement, Plasterig	Cement, Plasterig	Cement, Plasterig,,Colour,Putty	Cement, Plasterig,,Colour,Putty	Cement, Plasterig,C colour,Putty colour	Cement, Plasterig,C colour,Putty colour	Cement, Plasterig,C colour,Putty colour	Cement, Plasterig,C colour,Putty colour	Cement, Plasterig,C colour,Putty colour	Cement, Plasterig,C colour,Putty colour
3.Type of Bldng	Residential	Residential	Residential	Residential	Residential	Residential	Residential	Residential	Residential 56	Residential 57	Residential	Residential	Residential
4.Materials Used	Brick,Sand,Cement	Brick,Sand,Cement	Brick,Sand,Cement	Brick,Sand,Cement	Brick,Sand,Cement	Brick,Sand,Cement	Brick,Sand,Cement	Brick,Sand,Cement	Brick,Sand,Cement,,Colour,Putty	Brick,Sand,Cement,,Colour,Putty	Brick,Sand,Cement,	Brick,Sand,Cement	Brick,Sand,Cement
5.Technology used(Load Bearing or Column structure)	Column Structure	Column Structure	Column Structure	Column Structure	Column Structure	Column Structure	Column Structure	Column Structure	Column Structure	Column Structure	Column Structure	Column Structure	Column Structure
6.Footprint	NA	240 sqm	150 sqm	200 sqm	150 sqm	150 sqm	120 sqm	150 sqm	300 sqm	80 sqm	240 sqm	NA	NA
7.Year of Construction	2005-06	2005-06	2020-21	2020-21	2017-18	2018-19	2018-19	2019-20	2018-19	2009-10	2008-09	2009-10	2009-10
8.Floor to Floor Ht.	10'0"	10'0"	10'0"	10'0"	10'0"	10'0"	10'0"	10'0"	10'0"	10'0"	10'0"	10'0"	10'0"
9. Plot size	150' x 250'	80' x 40'	30' x 50'	40' x 50'	30' x 50'	50' x 30'	30' x 40'	30' x 50'	50' x 60'	20' x 40'	60' x 40'	NA	NA
10.Aspect Ratio (front width: side depth)	NA	2:1'	1:1.67	1:1.25	1:1.67	1.67:1	1:1.33	1:1.67	1:1.2	1:2	1.5:1	NA due to temporary nature	NA due to temporary nature
11. Any other observation	Group housing												



Fig 7: Details of Survey sheet 6

Source: Self

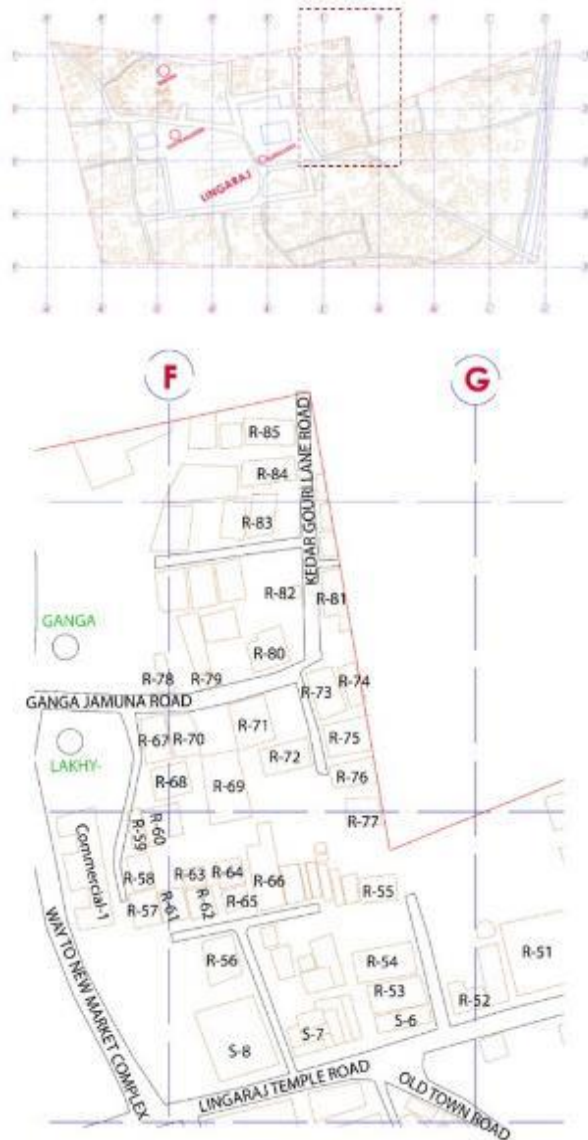


Parameters	C-1	R-61	R-62	R-63	R-64	R-65	R-66	R-67	R-68	R-69	R-70	R-71	R-72
1. Building Ht.	15'0"	10'0"	10'0"	20'0"	10'0"	22'0"	8'0"	20'0"	30'0"	10'0"	30'0"	9'0"	40'0"
2. Facade Treatment	Stones,	cement, plastering	Cocrete, Cement, Plastering	Cocrete, Cement, Plastering	Cocrete, Cement, Plastering	Cocrete, Cement, Plastering	Cocrete, Cement, Plastering	Cocrete, Cement, Plastering	Cocrete, Cement, Plastering	Cocrete, Cement, Plastering	Cocrete, Cement, Plastering	Cocrete, Cement, Plastering	Cocrete, Cement, Plastering
3. Type of Bldg	Commercial	Residential	Residential	Residential	Residential	Residential	Residential	Residential	Residential	Residential	Residential	Residential	Residential
4. Materials Used	Stone, Sand, Cement	Brick, Sand, Cement	Brick, Sand, Cement	Brick, Sand, Cement	Brick, Sand, Cement	Brick, Sand, Cement	Brick, Sand, Cement	Brick, Sand, Cement	Brick, Sand, Cement	Brick, Sand, Cement	Brick, Sand, Cement	Brick, Sand, Cement	Brick, Sand, Cement
5. Technology used (Load Bearing or Column structure)	Load bearing	Column Structure	Column Structure	Column Structure	Column Structure	Column Structure	Load Bearing	Column Structure	Column Structure	Column Structure	Column Structure	Load Bearing	Load Bearing
6. Footprint	200 sqm	90 sqm	120 sqm	120 sqm	120 sqm	120 sqm	NA	120 sqm	120 sqm	NA	120 sqm	150 sqm	120 sqm
7. Year of Construction	2015-16	2019-20	2018-19	2009-10	2009-10	2018-19	2012-13	2010-11	2011-12	2011-12	2008-09	2007-08	2019-20
8. Floor to Floor Ht.	14'	15'	11'	10'	10'	12'	NA	10'	10'	NA	10'	10'	10'
9. Plot size	80' x 30'	30' x 30'	30' x 40'	30' x 40'	30' x 40'	40' x 30'	NA	30' x 40'	40' x 30'	30' x 50'	30' x 40'	50' x 30'	30' x 40'
10. Aspect Ratio (front width: side depth)	2.67:1	1:1	1:1.33	1:1.33	1:1.33	1.33:1	NA due to temporary nature	1:1.33	1.33:1	NA due to ongoing work	1:1.33	1.67:1	1:1.33
11. Any other observation	Market complex												



Fig 8: Details of Survey sheet 7

Source: Self

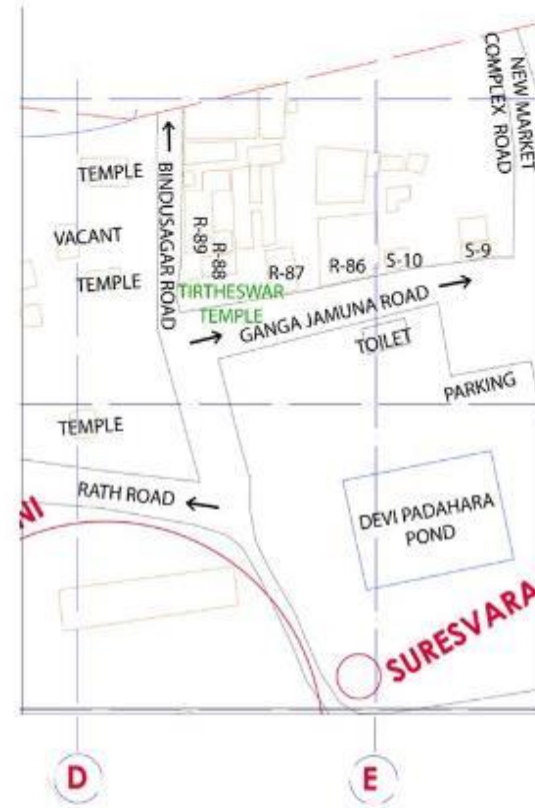
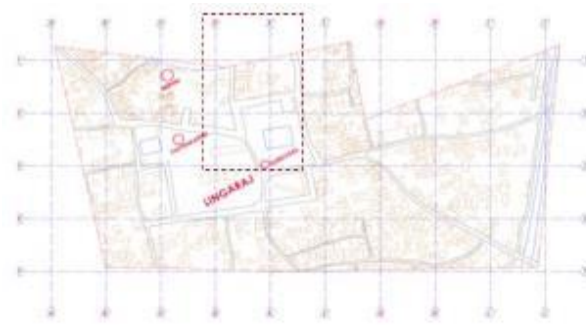


Parameters	R-73	R-74	R-75	R-76	R-77	R-78	R-79	R-80	R-81	R-82	R-83	R-84	R-85
1. Building Ht.	20'0"	20'0"	20'0"	20'0"	30'0"	20'0"	30'0"	22'0"	18'0"	20'	22'	33'	40'
2. Facade Treatment	Cocrete, Cement, Plastering	Cocrete, Cement, Plastering	Cocrete, Cement, Plastering	Cocrete, Cement, Plastering	Cocrete, Cement, Plastering	Cocrete, Cement, Plastering	Cocrete, Cement, Plastering	Cocrete, Cement, Plastering	Cocrete, Cement, Plastering	Incomplete	Cocrete, Cement, Plastering	Cocrete, Cement, Plastering	Cocrete, Cement, Plastering
3. Type of Bldg	Residential	Residential	Residential	Residential	Residential	Residential	Residential	Residential	Residential	Residential	Residential	Residential	Residential
4. Materials Used	Brick, Sand, Cement	Brick, Sand, Cement	Brick, Sand, Cement	Brick, Sand, Cement	Brick, Sand, Cement	Brick, Sand, Cement	Brick, Sand, Cement	Brick, Sand, Cement	Brick, Sand, Cement	Brick, Sand, Cement	Brick, Sand, Cement	Brick, Sand, Cement	Brick, Sand, Cement
5. Technology used (Load Bearing or Column structure)	Column Structure	Column Structure	Column Structure	Column Structure	Column Structure	Column Structure	Column Structure	Column Structure	Column Structure	Column Structure	Column Structure	Column Structure	Column Structure
6. Footprint	60 sqm	200 sqm	120 sqm	200 sqm	150 sqm	60 sqm	120 sqm	120 sqm	120 sqm	240 sqm	120 sqm	120 sqm	120 sqm
7. Year of Construction	2019-20	2018-19	2019-20	2009-10	2018-19	2005-06	2016-17	2015-16	2000-01	Incomplete	2003-04	2006-07	2009-10
8. Floor to Floor Ht.	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'
9. Plot size	20' x 30'	40' x 50'	40' x 30'	50' x 40'	30' x 50'	20' x 30'	30' x 40'	30' x 40'	40' x 30'	60' x 40'	40' x 30'	30' x 40'	30' x 40'
10. Aspect Ratio (front width: side depth)	1:1.5	1:1.25	1.33:1	1.25:1	1:1.67	1:1.5	1:1.33	1:1.33	1.33:1	1.5:1	1.33:1	1:1.33	1:1.33
11. Any other observation													



Fig 9: Details of Survey sheet 8

Source: Self



Parameters	S-9	S-10	R-86	R-87	R-88	R-89	Temple-1	Temple-2	Temple-3	Toilet
1. Building Ht.	12'	NA	60'	15'	20'	40'	15'	15'	15'	15'
2. Facade Treatment	NA	NA	Cement plaster and glass	Cement plaster	Cement plaster	Historic lime plaster	Brick cement sand	Brick cement sand	Brick cement sand	Stones and cement plaster
3. Type of Bldng	Shop	Shop	Commercial complex	Residential	Residential cum shop	Commercial	Temple	Temple	Temple	Public Amenities
4. Materials Used	Brick, cement and CGI sheet	Temporary	Cement concrete, steel and glass	Cement, brick and RCC	Cement, brick and RCC	Brick, lime, wood and stones	Brick work	Brick work	Brick work	Stones, RCC
5. Technology used (Load Bearing or Column structure)	Load bearing	Temporary	Column structure	Load bearing	Column structure	Load bearing	Load Bearing	Load Bearing	Load Bearing	Load bearing
6. Footprint	NA	NA	200 sqm	200 sqm	120 sqm	400 sqm	NA	NA	NA	150 sqm
7. Year of Construction	NA	NA	2020-21	2005-06	2005-06	Early 1900s	NA	NA	NA	2006-07
8. Floor to Floor Ht.	12'	NA	12'	11'	10'	15'	NA ITS TEMPLE	NA ITS TEMPLE	NA ITS TEMPLE	12'
9. Plot size	NA	NA	40' x 50'	50' x 40'	30' x 40'	100' x 60'	NA as it's a temple	NA being a temple	NA being a temple	50' x 30'
10. Aspect Ratio (front width: side depth)	NA due to temporary nature	NA due to temporary nature	1:1.25	1.25:1	1:1.33	1.67:1	NA as it's a temple	NA being a temple	NA being a temple	1.67:1
11. Any other observation						Dharamshala				Public infrastructure

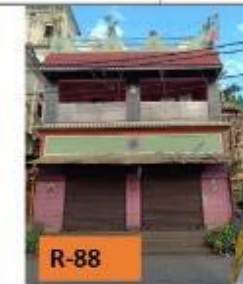
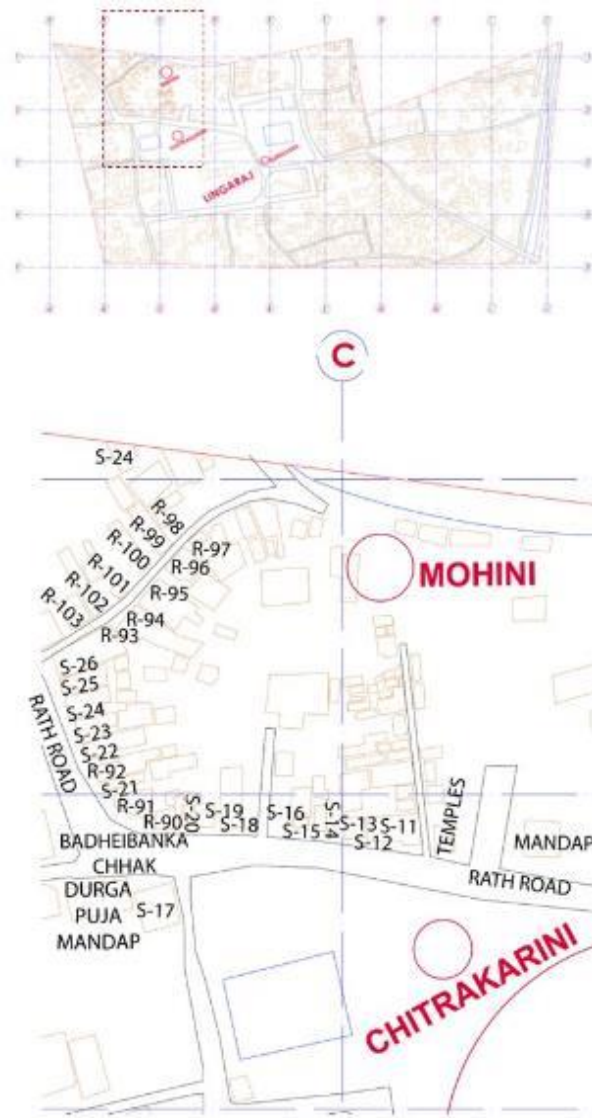


Fig 10: Details of Survey sheet 9

Source: Self

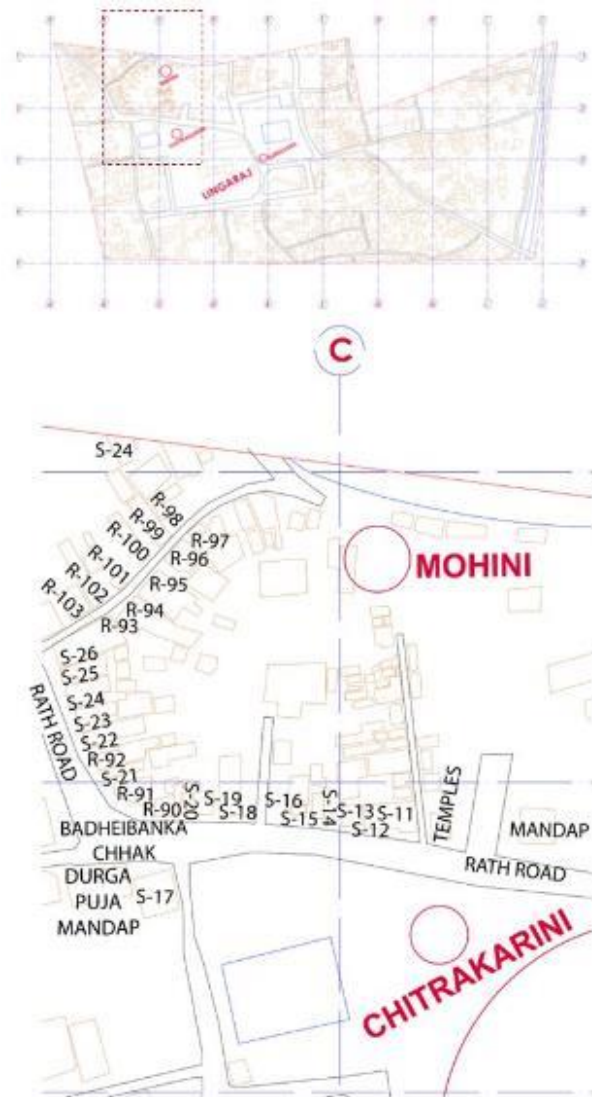


Parameters	R-90	R-91	S-11	S-12	S-13	S-14	S-15	S-16	S-17	S-18	S-19	S-20	DURGA PUJA	MANDAP
1. Building Ht.	20'	15'	22'	40'	20'	25'	30'	25'	10'	20'	15'	15'	30'	NA
2. Facade Treatment	Cement plaster, steel, wood	Cement plaster, burnt clay tiles, stones	Modern tiles, cement plaster	Cement plaster, glass, steel	Cement plaster, steel, glass	Cement plaster	Cement plaster	Cement plaster	Cement plaster, wood	Cement plaster, steel	Cement plaster, steel	Cement plaster, steel	Cement plaster, steel	Cement plaster in base
3. Type of Bldg	Residential	Residential	Residential/shop	Residential/shop	Shop	Residential/shop	Residential	Residential	Residential/shop	Residential/shop	Shop	Shop	Religious	Religious
4. Materials Used	RCC, Bricks	Bricks, clay tiles	RCC, Bricks	RCC, Bricks	RCC, Bricks	RCC, Bricks	RCC, Bricks	RCC, Bricks	RCC, Bricks	RCC, Bricks	RCC, Bricks	RCC, Bricks	RCC, Bricks	Bricks
5. Technology used (Load Bearing or Column structure)	Column structure	Load bearing	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Load bearing	Column structure	Load bearing	Load bearing	Column structure	Load bearing
6. Footprint	120 sqm	NA	150 sqm	120 sqm	150 sqm	80 sqm	45 sqm	120 sqm	200 sqm	120 sqm	60 sqm	30 sqm	NA	NA
7. Year of Construction	1996	1988	1998	2001-02	2001-02	2010-11	2015-16	2005-06	1999	2005-06	1999	2008-09	2010-11	NA
8. Floor to Floor Ht.	10'	15'	12'	10'	10'	10'	10'	12'	10'	10'	10'	10'	30'	NA
9. Plot size	30' x 40'	50, 60'	30' x 50'	30' x 40'	50' x 30'	20' x 40'	15' x 30'	30' x 40'	40' x 50'	30' x 40'	30' x 20'	15' x 20'	NA	NA
10. Aspect Ratio (front width: side depth)	1:1.33	NA due to temp. nature	1:1.67	1:1.33	1.67:1	1:2	1:2	1:1.33	1:1.25	1:1.33	1.5:1	1:1.33	NA due to nature of bldg.	NA due to nature of bldg.
11. Any other observation														



Fig 11: Details of Survey sheet 10

Source: Self



Parameters	R-92	R-93	R-94	R-95	R-96	R-97	R-98	S-21	S-22	S-23	S-24	S-25	S-26
1. Building Ht.	30'	20'	20'	20'	20'	20'	30'	20'	15'	20'	30'	10'	30'
2. Facade Treatment	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster
3. Type of Bldg	Residential	Residential	Residential	Residential	Residential	Residential	Residential	Shop/Residential	Shop/Residential	Shop/Residential	Shop/Residential	Shop/Residential	Shop/Residential
4. Materials Used	RCC, Bricks	RCC, Bricks	RCC, Bricks	RCC, Bricks	RCC, Bricks	RCC, Bricks	RCC, Bricks	RCC, Bricks	RCC, Bricks	RCC, Bricks	RCC, Bricks	RCC, Bricks	RCC, Bricks
5. Technology used (Load Bearing or Column structure)	Column Structure	Column Structure	Column Structure	Column Structure	Column Structure	Column Structure	Column Structure	Column Structure	Column Structure	Column Structure	Column Structure	Column Structure	Column Structure
6. Footprint	80 sqm	80 sqm	120 sqm	120 sqm	120 sqm	120 sqm	60 sqm	60 sqm	120 sqm	120 sqm	120 sqm	120 sqm	150 sqm
7. Year of Construction	2015-16	2016-17	2015-16	2018-19	2012-13	2015-16	2014-15	2012-13	2014-15	2015-16	2016-17	2018-19	2019
8. Floor to Floor Ht.	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'
9. Plot size	20' x 40'	20' x 40'	40' x 30'	40' x 30'	30' x 40'	30' x 40'	15' x 40'	15' x 40'	30' x 40'	30' x 40'	30' x 40'	30' x 40'	30' x 50'
10. Aspect Ratio (front width: side depth)	1:2	1:2	1.33:1	1.33:1	1:1.33	1:1.33	1:2.66	1:2.66	1:1.33	1:1.33	1:1.33	1:1.33	1:1.67
11. Any other observation													



Fig 12: Details of Survey sheet 11

Source: Self

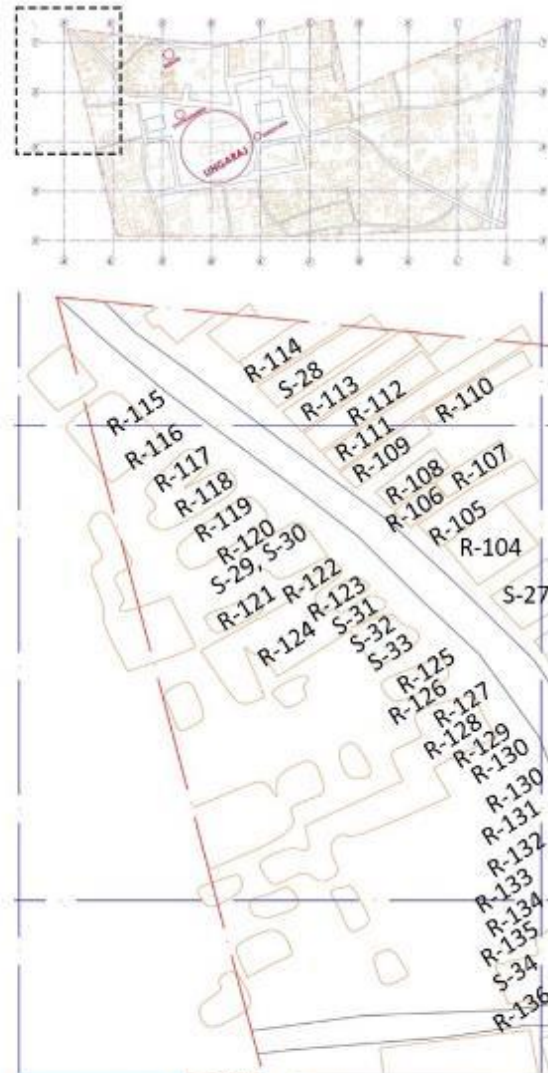


Parameters	R-99	R-100	R-101	R-102	R-103	S-27	R-104	R-105	R-106	R-107	R-108	R-109	R-110
1. Building Ht.	22'	15'	20'	20'	30'	18'	30'	30'	20'	20'	20'	20'	30'
2. Facade Treatment	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster
3. Type of Bldg	Residential	Residential	Residential	Residential	Residential	Shop/Residential	Residential	Residential	Residential	Residential	Residential	Residential	Residential
4. Materials Used	Bricks, RCC, Cement	Bricks, RCC, Cement	Bricks, RCC, Cement	Bricks, RCC, Cement	Bricks, RCC, Cement	Bricks, RCC, Cement	Bricks, RCC, Cement	Bricks, RCC, Cement	Bricks, RCC, Cement	Bricks, RCC, Cement	Bricks, RCC, Cement	Bricks, RCC, Cement	Bricks, RCC, Cement
5. Technology used (Load Bearing or Column structure)	Column structure	Load bearing	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure
6. Footprint	150sqm	150sqm	100sqm	100sqm	90sqm	150sqm	150sqm	120sqm	60sqm	60sqm	150sqm	125sqm	100sqm
7. Year of Construction	1996-97	1988-89	2001-02	2015-16	2008-09	2005-06	2001-02	2003-04	2005-06	2008-09	2010-11	2018-19	2010-11
8. Floor to Floor Ht.	10'	12'	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'
9. Plot size	30' x 50'	30' x 50'	20' x 50'	20' x 50'	30' x 30'	30' x 50'	30' x 50'	20' x 60'	20' x 30'	20' x 30'	30' x 50'	25' x 50'	20' x 50'
10. Aspect Ratio (front width: side depth)	1:1.67	1:1.67	1:2.5	1:2.5	1:1	1:1.67	1:1.67	1:3	1:1.5	1:1.5	1:1.67	1:2	1:2.5
11. Any other observation													



Fig 13: Details of Survey sheet 12

Source: Self



Parameters	R-111	R-112	R-113	R-114	S-28	R-115	R-116	R-117	R-118	R-119	R-120	S-29	S-30
1. Building Ht.	30'	20'	20'	20'	30'	20'	20'	30'	30'	30'	30'	20'	20'
2. Facade Treatment	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster
3. Type of Bldng	Residential	Residential	Residential	Residential	Shop/Residential	Residential	Residential	Shop/Residential	Shop/Residential	Shop/Residential	Shop/Residential	Shop/Residential	Shop/Residential
4. Materials Used	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement
5. Technology used (Load Bearing or Column structure)	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure
6. Footprint	240sqm	120sqm	120sqm	100sqm	100sqm	75sqm	100sqm	100sqm	60sqm	50sqm	75sqm	45sqm	45sqm
7. Year of Construction	2000-01	2020-21	2020-21	2021-22	2020-21	20010-11	20011-12	2015-16	2018-19	2014-15	2008-09	2010-11	2008-09
8. Floor to Floor Ht.	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'
9. Plot size	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'
10. Aspect Ratio (front width: side depth)	1:6	1:3	1:3	1:2.5	1:2.5	1:3.33	1:2.5	1:2.5	1:4.16	1:5	1:3.33	1:2	1:2
11. Any other observation													



Fig 14: Details of Survey sheet 13

Source: Self



Parameters	R-121	R-122	R-123	R-124	S-31	S-32	S-33	R-125	R-126	R-127	R-128	R129	R130
1. Building Ht.	30'	20'	30'	20'	15'	15'	25'	40'	20'	20'	20'	30'	30'
2. Facade Treatment	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster
3. Type of Bldng	Residential	Residential	Residential	Residential	Shop/Residential	Shop/Residential	Shop/Residential	Residential	Residential	Residential	Residential	Residential	Residential
4. Materials Used	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement
5. Technology used (Load Bearing or Column structure)	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure
6. Footprint	100sqm	200sqm	160sqm	100sqm	120sqm	80sqm	60sqm	60sqm	60sqm	60sqm	60sqm	60sqm	60sqm
7. Year of Construction	1998-99	1996-97	2001-02	2005-06	2010-11	2005-06	2000-01	2003-04	1999-00	2010-11	2000-01	2015-16	2017-18
8. Floor to Floor Ht.	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'
9. Plot size	20'x50'	20'x100'	20'x80'	20'x50'	30'x40'	20'x40'	15'x40'	15'x40'	15'x40'	10'x40'	10'x40'	15'x40'	15'x40'
10. Aspect Ratio (front width: side depth)	1:2.5	1:5	1:4	1:2.5	1:1.33	1:2	1:2.66	1:2.66	1:2.66	1:4	1:4	1:2.66	1:2.66
11. Any other observation													



Fig 15: Details of Survey sheet 14

Source: Self



Fig 16: Details of Survey sheet 15

Source: Self



Fig 17: Details of Survey sheet 16

Source: Self



Parameters	R-143	R-144	R-145	R-146	R-147	R-148	R-149	R-150	R-151	R-152	R-153
1. Building Ht.	38'	25'	12'	50'	20'	25'	30'	20'	30'	30'	30'
2. Facade Treatment	Cement plaster	Cement plaster	Brick, Tali, Cement	Cement plaster	Cement plaster As bester	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster tali	Cement plaster
3. Type of Bldng	Residential	Residential	Residential	Residential	Residential	Residential	Residential	Residential	Residential	Residential	Residential
4. Materials Used	Brick, RCC, Cement	Brick, RCC, Cement	Brick, Sand, tali, Cement	Brick, RCC, Cement	Brick, RCC, Cement, As bester	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement
5. Technology used (Load Bearing or Column structure)	Column structure	Column structure	Load Bearing	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure
6. Footprint	100 sqm	80 sqm	120 sqm	150 sqm	120 sqm	120 sqm	180 sqm	120 sqm	150 sqm	180 sqm	120 sqm
7. Year of Construction	2008	2002	1990	1995	1998	2001	2002	2005	1991	1999	1998
8. Floor to Floor Ht.	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'
9. Plot size	20' x 40'	20' x 40'	40' x 30'	25' x 50'	40' x 20'	30' : 40'	30' x 40'	15' x 40'	30' x 40'	30' x 40'	30' x 40'
9. Aspect Ratio (front width: side depth)	1:2	1:2	1.34:1	1:2	2:1	1:1.3	1:1.3	1:2.6	1:1.3	1:1.3	1:1.3
10. Any other observation											



Fig 18: Details of Survey sheet 17

Source: Self

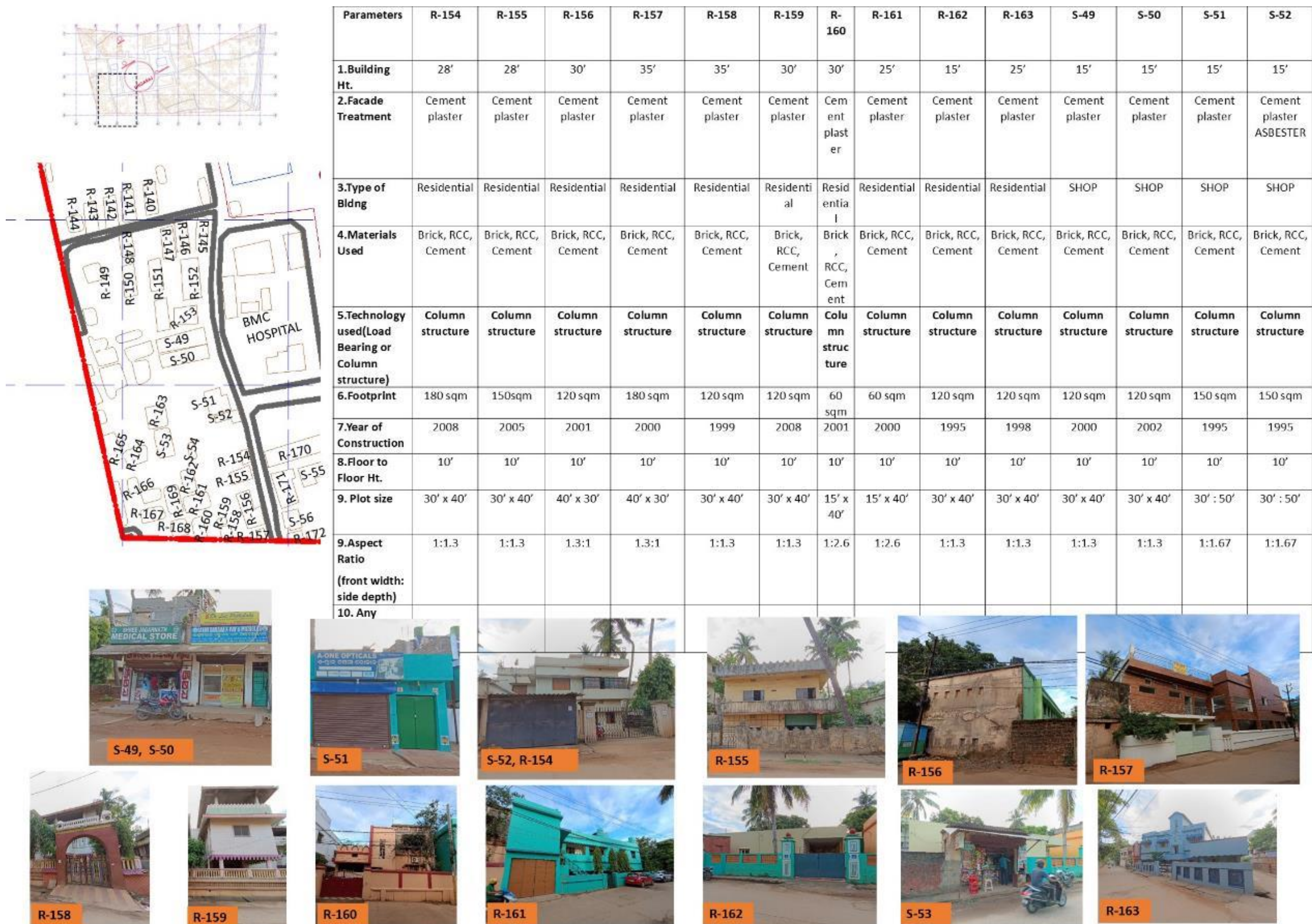


Fig 19: Details of Survey sheet 18

Source: Self



Parameters	R-164	R-165	R-166	R-167	R-168	R-169	R-170	R-171	R-172	S-54	S-55	S-56	BMC HOSPITAL
1. Building Ht.	15'	30'	20'	30'	15'	20'	20'	12'	30'	25'	15'	15'	30'
2. Facade Treatment	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Brick cement plaster	Cement plaster	Cement plaster
3. Type of Bldng	Residential	Residential	Residential	Residential SHOP	Residential	Residential	Residential/SHOP	Residential	Residential	Residential/SHOP	SHOP	SHOP	HOSPITAL
4. Materials Used	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, Cement ASBESTER	Brick, RCC, Cement	Brick, RCC, Cement
5. Technology used (Load Bearing or Column structure)	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Load Bearing	Column structure	Column structure	Load Bearing	Load Bearing	Column structure
6. Footprint	80 sqm	80 sqm	120 sqm	120 sqm	120 sqm	120 sqm	60 sqm	60 sqm	120 sqm	120 sqm	120 sqm	120 sqm	180sqm
7. Year of Construction	2005	2001	1995	1998	2000	1992	1990	1996	2001	2003	2005	1995	1980
8. Floor to Floor Ht.	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'
9. Plot size	20' x 40'	20' x 40'	40' x 30'	40' x 30'	30' x 40'	30' x 40'	15' x 40'	15' x 40'	30' x 40'	30' x 40'	30' x 40'	30' x 40'	NA
9. Aspect Ratio (front width: side depth)	1:2	1:2	1.3:1	1.3:1	1:1.3	1"1.4	1:2.67	1:2.67	1:1.3	1:1.3	1:1.3	1:1.3	NA
10. Any other observation													



R-164



R-165



R-166



R-167



R-168, R-169

Fig 20: Details of Survey sheet 19

Source: Self



R-170



R-171



R-172



S-54



S-55



S-56



BMC HOSPITAL



Parameters	R-173	R-174	R-175	R-175	R-176	R-177	R-178	R-179	R-180	R-181	R-182	R-183
1. Building Ht.	15'	30'	15'	15'	15'	30'	15'	30'	30'	30'	15'	15'
2. Facade Treatment	Cement plaster	Cement plaster	Cement plaster asbester	Cement plaster	Cement plaster	Cement plaster	Cement plaster asbester	Cement plaster	Cement plaster	Cement plaster	Cement plaster asbester	Cement plaster asbester
3. Type of Bldg	Residential	Residential	Residential	Residential	Residential	Residential	Residential	Residential	Residential	Residential	Residential	Residential
4. Materials Used	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement
5. Technology used (Load Bearing or Column structure)	Column structure	Column structure	Load Bearing	Column structure	Column structure	Column structure	Load Bearing	Column structure	Column structure	Column structure	Load Bearing	Load Bearing
6. Footprint	80 sqm	150 sqm	80 sqm	120 sqm	120 sqm	180 sqm	60 sqm	160 sqm	180 sqm	150 sqm	90 sqm	60 sqm
7. Year of Construction	2001	2005	1995	1998	1985	1999	2000	2001	2003	2002	2005	2006
8. Floor to Floor Ht.	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'
9. Plot size	30x15	30' x 40'	30' x 15'	40' x 10'	30' x 40'	40' x 10'	25' x 40'	30' x 40'	30' x 40'	30' x 40'	40' x 10'	35'x10
9. Aspect Ratio (front width: side depth)	2:1	1:1.34	2:1	4:1	1:1.34	4:1	1:1.6	1:1.34	1:1.34	1:1.34	4:1	3.5:1
10. Any other observation												



Fig 21: Details of Survey sheet 20

Source: Self



Parameters	R-184	R-185	R-186	R-187	R-188	R-189	R-190	S-57	S-58	S-59	S-60	S-61	S-62	S-63	S-64	S-65
1. Building Ht.	12'	15'	25'	30'	15'	30'	20'	15'	15'	15'	15'	15'	15'	20'	15'	15'
2. Facade Treatment	Tin	Cement plaster asbester	Cement t plaster	Cement plaster	Cement plaster Tali	Cement plaster	Cement plaster	Cement plaster Tali	Cement plaster	Cement plaster Tali	Cement plaster asbester	Cement plaster asbester	Cement plaster asbester	Cement plaster	Cement plaster asbester	Cement plaster asbester
3. Type of Bldg	Residential	Residential	Residential	Residential	Residential	Residential	Residential	shop	shop	shop	shop	shop	shop	shop	shop	shop
4. Materials Used	Tin	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement
5. Technology used (Load Bearing or Column structure)	Temporary	Load Bearing	Column structure	Column structure	Load Bearing	Column structure	Column structure	Load Bearing	Column structure	Load Bearing	Load Bearing	Load Bearing	Load Bearing	Column structure	Load Bearing	Load Bearing
6. Footprint	80 sqm	120sqm	150 sqm	120 sqm	180 sqm	120 sqm	60 sqm	60 sqm	120 sqm	90sqm	120 sqm	90sqm	60 sqm	90sqm	60sqm	60sqm
7. Year of Construction	1990	2001	2002	2003	1995	1998	1997	1995	2000	1995	1996	2001	2002	2003	2002	2001
8. Floor to Floor Ht.	9'	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'
9. Plot size	20' x 40'	20' x 40'	40' x 30'	40' x 30'	30' x 40'	30' x 40'	25' x 40'	35' x 40'	30' x 40'	30' x 40'	30' x 40'	30' x 40'	30' x 40'	15'x30'	15'x25'	15'x25'
9. Aspect Ratio (front width: side depth)	1:2	1:2	1.34:1	1.34:1	1:1.34	1:1.34	1:1.6	1:1.14	1:1.34	1:1.34	1:1.34	1:1.34	1:1.34	1:2	1:1.67	1:1.67
10. Any other observation																

Fig 22: Details of Survey sheet 21

Source: Self



Parameters	R-191	R-192	R-193	R-194	R-195	R-196	R-197	R-198	R-199	R-200	S-66	S-67	S-68	S-69	S-70	S-71	S-72	S-73	S-74	S-75	S-76
1. Building Ht.	30'	30'	15'	30'	25'	25'	25'	30'	30'	30'	30'	15'	15'	15'	15'	15'	15'	12'	12'	12'	30'
2. Facade Treatment	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster
3. Type of Bldg	Residential	Residential shop	Residential shop	Residential shop	Residential shop	Residential shop	Residential shop	Residential shop	Residential shop	Residential shop	Residential shop	shop	shop	shop	shop	shop	shop	shop	shop	shop	shop
4. Materials Used	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement
5. Technology used (Load Bearing or Column structure)	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Load bearing	Load bearing	Load bearing	Column structure
6. Footprint	80 sqm	80 sqm	120 sqm	120 sqm	120 sqm	120 sqm	60 sqm	60 sqm	120 sqm	120 sqm	120 sqm	120 sqm	150 sqm	60 sqm	80 sqm	90 sqm	60 sqm	60 sqm	90 sqm	60 sqm	120 sqm
7. Year of Construction	2001	2005	1995	1991	1989	1998	2000	2002	1999	1998	2005	2007	2009	1998	1985	1999	1996	1998	2000	2002	1998
8. Floor to Floor Ht.	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'
9. Plot size	20' x 40'	20' x 40'	15x25	25x40	30' x 40'	30' x 40'	25' x 40'	35' x 40'	30' x 40'	30' x 40'	40x20	30x 40	25x40	35x40	15x25	15x25	15x25	10x30	10x30	10x30	25x40
9. Aspect Ratio (front width: side depth)	1:2	1:2	1:1.67	1:1.6	1:1.34	1:1.34	1:1.6	1:1.14	1:1.34	1:1.34	2:1	1:1.34	1:1.6	1:1.14	1:1.67	1:1.67	1:1.67	1:3	1:3	1:3	1:1.6
10. Any other observation																					

Fig 23: Details of Survey sheet 22

Source: Self



Parameters	R-203	R-204	R-205	R-206	R-207	R-208	R-209	R-210	R-211	R-212	R-213	R-214	R-215
1. Building Ht.	40'	40'	15'	25'	25'	35'	30'	30'	18'	30'	40'	30'	12'
2. Facade Treatment	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster ASBESTER
3. Type of Bldng	Residential	Residential	Residential	Residential	Residential	Residential	Residential	Residential	Residential	Residential	Residential	Residential	Residential
4. Materials Used	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement
5. Technology used (Load Bearing or Column structure)	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Load Bearing
6. Footprint	80 sqm	80 sqm	120 sqm	120 sqm	120 sqm	120 sqm	60 sqm	60 sqm	120 sqm	120 sqm	120 sqm	120 sqm	150 sqm
7. Year of Construction	2002	1998	1995	1992	2000	2001	1996	1992	2000	1996	2005	2006	2002
8. Floor to Floor Ht.	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'
9. Plot size	20' x 40'	20' x 40'	40' x 30'	40' x 30'	30' x 40'	30' x 40'	15' x 40'	15' x 40'	30' x 40'	30' x 40'	30' x 40'	30' x 40'	30' x 50'
9. Aspect Ratio (front width: side depth)	1:2	1:2	1.33:1	1.33:1	1:1.3	1:1.3	1:2.67	1:2.67	1:1.3	1:1.3	1:1.3	1:1.3	1:1.67
10. Any other observation													



R-203



R-204



R-205



R-206, R-207



R-208



R-209



R-210



R-211



R-212



R-213



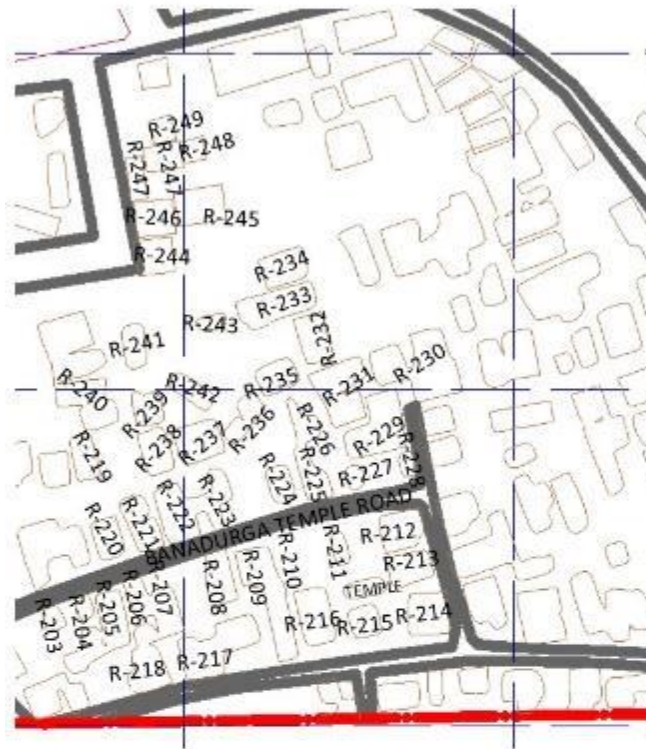
R-214



R-215

Fig 24: Details of Survey sheet 23

Source: Self

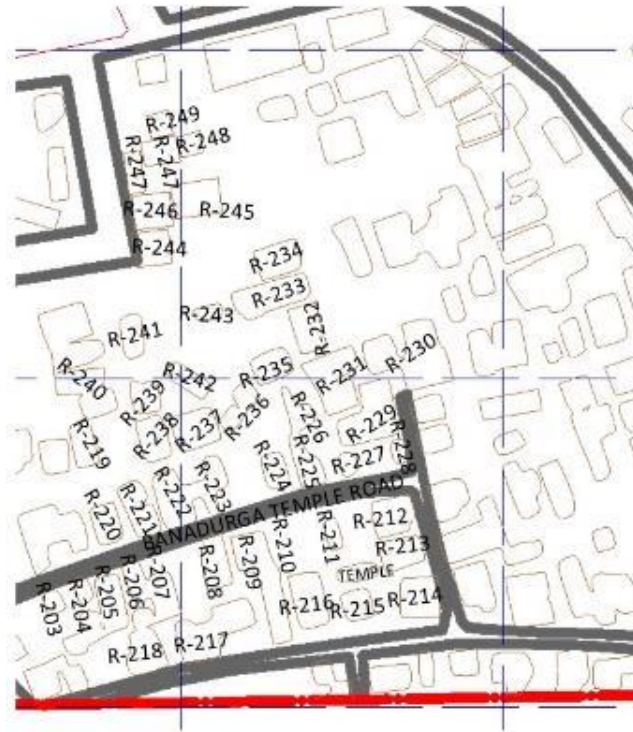


Parameters	R-216	R-217	R-218	R-219	R-220	R-221	R-222	R-223	R-224	R-225	R-226	TEMPLE
1. Building Ht.	30'	30'	35'	12'	30'	30'	30'	12'	12'	28'	20'	30'
2. Facade Treatment	Cement plaster	Cement plaster	Cement plaster	ASBESTER ,TIN	Cement plaster	Cement plaster	Cement plaster	Brick asbester cement	Brick asbester cement	Cement plaster	Brick ,rcc	Cement plaster
3. Type of Bldng	Residential	Residential	Residential	Residential	Residential	Residential	Residential	Residential	Residential	Residential	Residential	TEMPLE
4. Materials Used	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, ASBESTER Tin	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, ASBESTER cement	Brick, ASBESTER cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement
5. Technology used (Load Bearing or Column structure)	Column structure	Column structure	Column structure	Temporary	Column structure	Column structure	Column structure	Load Bearing	Load Bearing	Column structure	Column structure	Column structure
6. Footprint	80 sqm	80 sqm	120 sqm	120 sqm	120 sqm	120 sqm	60 sqm	60 sqm	120 sqm	120 sqm	120 sqm	120 sqm
7. Year of Construction	2002	2000	1996	1998	1995	1992	1992	2000	2001	2003	2002	NA
8. Floor to Floor Ht.	10'	10'	10'	8'	10'	10'	10'	8'	8'	10'	10'	25'
9. Plot size	40' x 30'	40' x 30'	40' x 30'	40' x 30'	15' x 40'	30' x 40'	25' x 40'	30' x 15'	30' x 15'	30' x 40'	20' x 40'	40' x 20'
9. Aspect Ratio (front width: side depth)	1.33:1	1.33:1	1.33:1	1.33:1	1:2.67	1:1.3	1:2.67	2:1	2:1	1:1.3	1:2	2:1
10. Any other												



Fig 25: Details of Survey Sheet 24

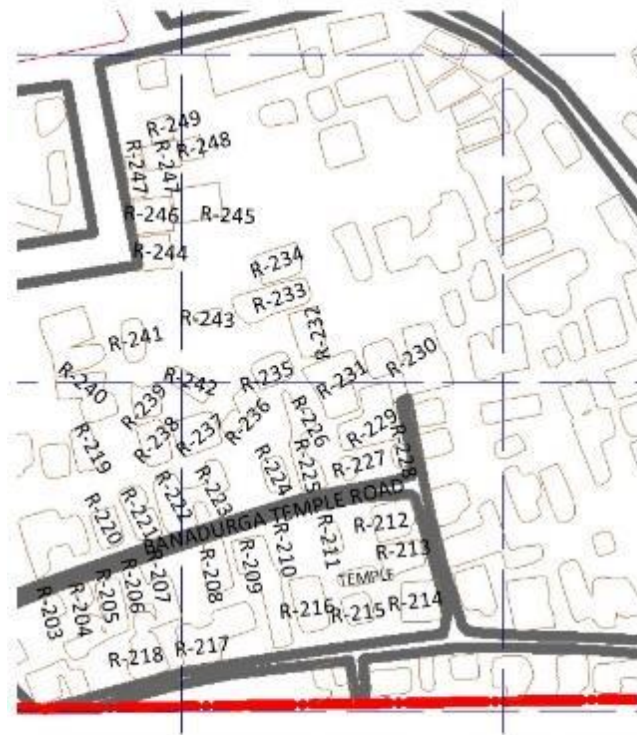
Source: Self



Parameters	R-227	R-228	R-229	R-230	R-231	R-231	R-232	R-233	R-234	R-235	R-236
1. Building Ht.	15'	30'	20'	28'	20'	28'	30'	40'	30'	20'	15'
2. Facade Treatment	Cement plaster ASBESTER	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster
3. Type of Bldng	Residential	Residential	Residential	Residential	Residential	Residential	Residential	Residential	Residential	Residential	Residential
4. Materials Used	Brick, RCC, Cement ASBESTER	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement
5. Technology used (Load Bearing or Column structure)	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure
6. Footprint	180 sqm	180 sqm	120 sqm	120 sqm	150 sqm	150 sqm	120 sqm	160 sqm	120 sqm	150 sqm	120 sqm
7. Year of Construction	2000	1996	1992	2002	2005	2005	2000	1993	1998	2009	2007
8. Floor to Floor Ht.	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'
9. Plot size	40' x 20'	40' x 30'	40' x 15'	40' x 30'	40' x 15'	40' x 40'	30' x 40'	40' x 35'	40' x 20'	30' x 15'	30' x 40'
9. Aspect Ratio (front width: side depth)	2:1	1.33:1	2.67:1	1.33:1	2.67:1	1:1	1:1.3	1.14:1	2:1	2:1	1:1.34
10. Any other observation											



Fig 26: Details of survey sheet 25 Source Self



Parameters	R-237	R238	R-239	R-240	R-241	R-242	R-243	R-244	R-245	R-246	R-247
1. Building Ht.	30'	30'	30'	40'	20'	20'	30'	12'	28'	15'	28'
2. Facade Treatment	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster ASBESTER	Cement plaster	Cement plaster	Cement plaster
3. Type of Bldng	Residential	Residential	Residential	Residential	Residential	Residential	Residential	Residential	Residential	Residential	Residential
4. Materials Used	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement, ASBESTER	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement
5. Technology used (Load Bearing or Column structure)	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Load Bearing	Column structure	Column structure	Column structure
6. Footprint	180 sqm	180 sqm	180 sqm	150 sqm	120 sqm	120 sqm	90 sqm	90 sqm	120 sqm	150 sqm	180 sqm
7. Year of Construction	2001	1995	2005	2003	2000	1998	2008	2002	1998	1999	19996
8. Floor to Floor Ht.	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'
9. Plot size	40' x 30'	40' x 30'	40' x 30'	40' x 30'	30' x 40'	40' x 25'	35' x 40'	40' x 15'	40' x 30'	40' x 20'	40' x 30'
9. Aspect Ratio (front width: side depth)	1.33:1	1.33:1	1.33:1	1.33:1	1:1.34	NA	1:1.14	2.67:1	1.33:1	2:1	1.33:1
10. Any other observation											



R-237



R-238



R-239



R-240



R-241



R-242



R-243



R-244



R-245



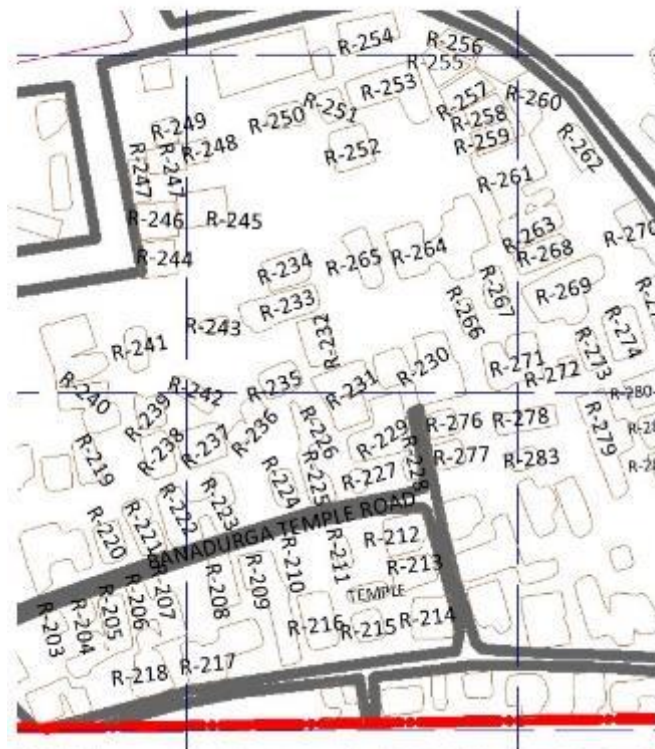
R-246



R-247

Fig 27: Details of Survey sheet 26

Source: Self



Parameters	R-248	R-249	R-250	R-251	R-252	R-253	R-254	R-255	R-256	R-257	R-258	R-259
1. Building Ht.	20'	28'	28'	28'	20'	12'	30'	20'	28'	28'	30'	20'
2. Facade Treatment	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	TIN	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster ASBESTER
3. Type of Bldg	Residential SHOP	Residential	Residential	Residential	Residential SHOP	Residential SHOP	Residential	Residential	Residential	Residential SHOP	Residential	Residential SHOP
4. Materials Used	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement, TIN	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement
5. Technology used (Load Bearing or Column structure)	Column structure	Column structure	Column structure	Column structure	Column structure	Load Bearing	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure
6. Footprint	180 sqm	150 sqm	150 sqm	120 sqm	90 sqm	120 sqm	150 sqm	180 sqm	150 sqm	180 sqm	150 sqm	120 sqm
7. Year of Construction	2008	1990	1995	1985	1980	1985	1980	1990	2000	2003	2002	1996
8. Floor to Floor Ht.	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'
9. Plot size	40' x 25'	35' x 40'	40' x 30'	30' x 40'	30' x 40'	30' x 20'	35' x 40'	35' x 40'	20' x 40'	30' x 40'	30' x 40'	30' x 40'
9. Aspect Ratio (front width: side depth)	NA	1:1.14	1.33:1	1:1.34	1:1.34	NA	1:1.14	1:1.14	1:2	1:1.34	1:1.34	1:1.34
10. Any other observation												



Fig 28: Details of Survey sheet 27

Source: Self

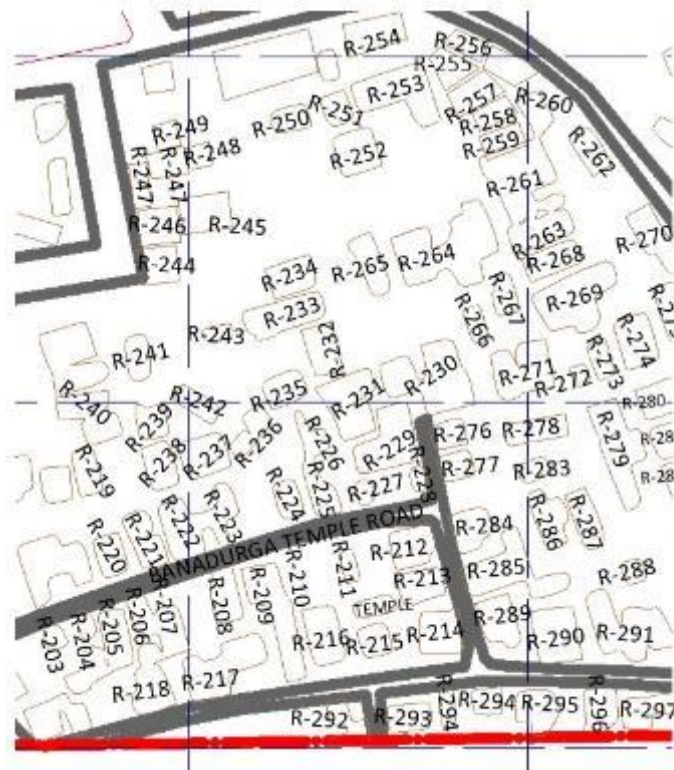


Parameters	R-260	R-261	R-262	R-263	R-264	R-265	R-266	R-267	R-268	R-269	R-270	R-271
1. Building Ht.	30'	20'	15'	20'	28'	28'	28'	15'	28'	28'	30'	15'
2. Facade Treatment	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster
3. Type of Bldng	Residential	Residential	Residential	Residential	Residential	Residential	Residential	Residential	Residential	Residential	Residential SHOP	Residential
4. Materials Used	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement
5. Technology used (Load Bearing or Column structure)	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure
6. Footprint	180 sqm	180 sqm	180 sqm	120 sqm	120 sqm	120 sqm	120 sqm	60 sqm	60 sqm	120 sqm	120 sqm	120 sqm
7. Year of Construction	1995	1980	1985	1998	1979	1985	1980	1982	1978	1982	2000	2005
8. Floor to Floor Ht.	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'
9. Plot size	30'x40'	20' x 40'	20' x 40'	40' x 30'	40' x 30'	30' x 40'	30' x 40'	15' x 40'	15' x 40'	30' x 40'	30' x 40'	30' x 40'
10. Aspect Ratio (front width: side depth)	1:1.34	1:2	1:2	1.33:1	1.33:1	1:1.34	1:1.34	1:2.67	1:2.67	1:1.34	1:1.34	1:1.34
11. Any other observation												



Fig 29: Details of Survey sheet 28

Source: Self

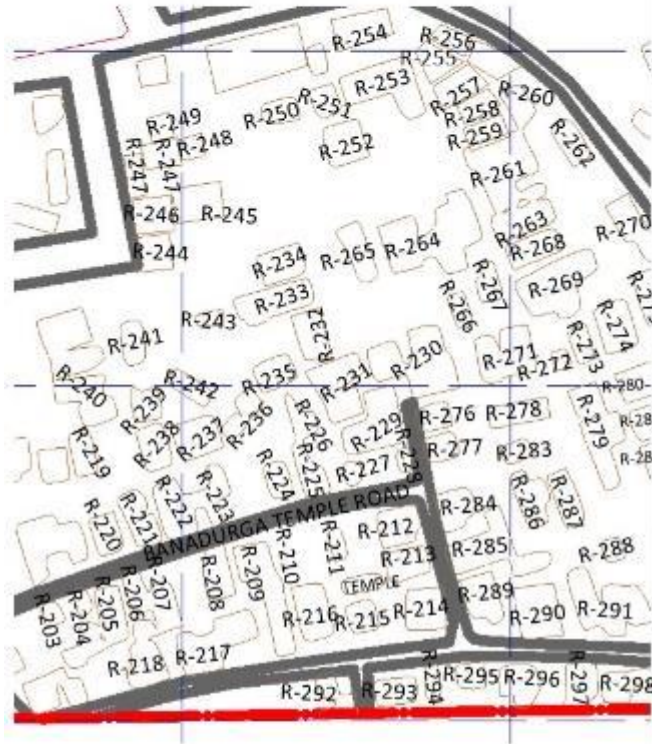


Parameters	R-272	R-273	R-274	R-275	R-276	R-277	R-278	R-279	R-280	R-281	R-282	R-283
1. Building Ht.	30'	18'	12'	18'	30'	25'	30'	30'	12'	18'	25'	30'
2. Facade Treatment	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster
3. Type of Bldg	Residential	Residential	Residential	Residential	Residential	Residential	Residential	Residential	Residential	Residential	Residential	Residential
4. Materials Used	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement
5. Technology used (Load Bearing or Column structure)	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure
6. Footprint	180 sqm	150sqm	120 sqm	120 sqm	120 sqm	150 sqm	60 sqm	180 sqm	120 sqm	120 sqm	150 sqm	120 sqm
7. Year of Construction	2005	1998	1980	1985	1980	1986	1998	2002	2005	2007	1990	2000
8. Floor to Floor Ht.	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'
9. Plot size	20' x 40'	20' x 40'	40' x 30'	40' x 30'	30' x 40'	30' x 40'	15' x 40'	15' x 40'	30' x 40'	30' x 40'	30' x 40'	30' : 40'
10. Aspect Ratio (front width: side depth)	1:2	1:2	1.33:1	1.33:1	1:1.33	1:1.33	1:2.67	1:2.67	1:1.33	1:1.33	1:1.33	1:1.33
11. Any other observation												



Fig 30: Details of Survey sheet 29

Source: Self



Parameters	R-284	R-285	R-286	R-287	R-288	R-289	R-290	R-291	R-292	R-293	R-294	R-295	R-296
1. Building Ht.	18'	30'	28'	20'	20'	28'	30'	15'	15'	25'	30'	18'	28'
2. Facade Treatment	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster
3. Type of Bldg	Residential	Residential	Residential	Residential	Residential	Residential	Residential	Residential	Residential	Residential	Residential	Residential	Residential
4. Materials Used	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement
5. Technology used (Load Bearing or Column structure)	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure
6. Footprint	180 sqm	110 sqm	120 sqm	150 sqm	120 sqm	180 sqm	160 sqm	160 sqm	120 sqm	180 sqm	120 sqm	130 sqm	150 sqm
7. Year of Construction	1980	1985	1999	1990	1982	1986	1988	1990	1997	2000	1992	1995	1999
8. Floor to Floor Ht.	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'
9. Plot size	30' x 40'	20' x 40'	40' x 30'	40' x 30'	30' x 40'	30' x 40'	15' x 40'	15' x 40'	30' x 40'	30' x 40'	30' x 40'	30' x 40'	30' : 50'
10. Aspect Ratio (front width: side depth)	1:1.33	1:2	1.33:1	1.33:1	1:1.33	1:1.33	1:2.67	1:2.67	1:1.33	1:1.33	1:1.33	1:1.33	1:1.67
11. Any other observation													



Fig 31: Details of Survey sheet 30

Source: Self

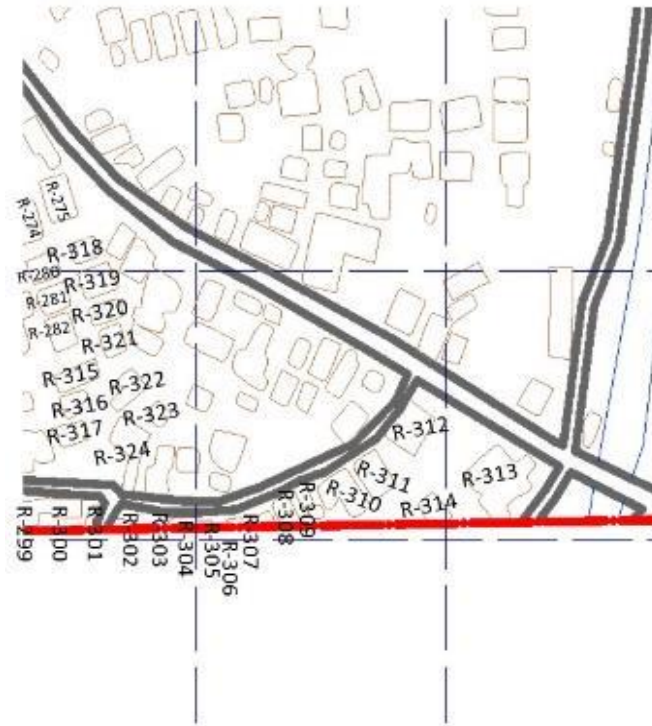


Parameters	R-297	R-298	R-299	R-300	R-301	R-302	R-303	R-304	R-305	R-306	R-307	R-308	R-309
1. Building Ht.	20'	30'	20'	15'	28'	20'	18'	20'	15'	12'	28'	20'	18'
2. Facade Treatment	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Tin plaster	Cement plaster	Cement plaster	Cement plaster
3. Type of Bldng	Residential	Residential	Residential	Residential	Residential	Residential	Residential	Residential	Residential	Residential	Residential	Residential	Residential
4. Materials Used	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, Tin cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement
5. Technology used (Load Bearing or Column structure)	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Load Bearing	Column structure	Column structure	Column structure
6. Footprint	180 sqm	150 sqm	150 sqm	120 sqm	180 sqm	150 sqm	90 sqm	150 sqm	120 sqm	180 sqm	120 sqm	150 sqm	150 sqm
7. Year of Construction	1990	1995	1980	1985	1986	1982	1995	1990	2000	2002	2005	2001	2007
8. Floor to Floor Ht.	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'
9. Plot size	20' x 40'	20' x 40'	40' x 30'	40' x 30'	30' x 40'	30' x 40'	15' x 40'	15' x 40'	30' x 40'	30' x 40'	30' x 40'	30' x 40'	30' x 50'
10. Aspect Ratio (front width: side depth)	1:2	1:2	1.33:1	1.33:1	1:1.33	1:1.33	1:2.67	1:2.67	1:1.33	1:1.33	1:1.33	1:1.33	1:1.67
11. Any other observation													



Fig 32: Details of Survey sheet 31

Source: Self



Parameters	R-310	R-311	R-312	R-313	R-314	R-315	R-316	R-317	R-318	R-319	R-320	R-321	R-322	R-323
1. Building Ht.	30'	28'	15'	28'	25'	15'	30'	40'	18'	25'	25'	30'	30'	15'
2. Facade Treatment	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster
3. Type of Bldng	Residential	Residential	Residential	Residential	Residential	Residential	Residential	Residential shop	Residential	Residential	Residential	Residential	Residential	Residential
4. Materials Used	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement
5. Technology used (Load Bearing or Column structure)	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure
6. Footprint	180 sqm	120 sqm	120 sqm	150 sqm	120 sqm	140 sqm	150 sqm	110sqm	120 sqm	150 sqm	120 sqm	180 sqm	150 sqm	160sqm
7. Year of Construction	1990	1985	2001	1985	2000	1990	1988	2000	1991	1990	1992	1990	1985	1989
8. Floor to Floor Ht.	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'
9. Plot size	30' x 40'	20' x 40'	40' x 25'	40' x 30'	30' x 40'	40' x 30'	35' x 40'	35' x 40'	30' x 40'	35' x 40'	30' x 40'	30' x 40'	30' x 50'	35 x 40
10. Aspect Ratio (front width: side depth)	1:1.33	1:2	1:1.6	1:33:1	1:1.33	1.33:1	1:1.15	1:1.15	1:1.33	1:1.15	1:1.33	1:1.33	1:1.66	1:1.15
11. Any other observation														



R-310



R-311



R-312



R-313



R-314



R-315



R-316



R-317



R-318



R-319



R-320



R-321



R-322



R-323

Fig 33: Details of Survey sheet 32

Source: Self

	Parameters	R-324	R-325	R-326	R-327	R-328	R-329	R-330	R-331	R-332	R-333	S-77	S-78	S-79
	1.Building Ht.	28'	28'	15'	12'	28'	20'	28'	15'	25'	22'	12'	12'	15'
	2.Facade Treatment	Cement plaster	Cement plaster	Cement plaster	Brick ,tali	Cement plaster	Cement plaster	Cement plaster	Brick ,tali	Cement plaster	Cement plaster	Brick asbestor	tin	Brick asbestor
	3.Type of Bldng	Residential	Residential	Residentia l/shop	Residenti al	Residential	Residential	Residential	Residential	Residential	Residential shop	shop	shop	shop
	4.Materials Used	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, tali, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, tali, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, asbestor,Ce ment	Tin,asbeste r	Brick, asbestor,Ce ment
	5.Technolog y used(Load Bearing or Column structure)	Column structure	Column structure	Column structure	Load Bearing	Column structure	Column structure	Column structure	Load Bearing	Column structure	Load Bearing	Load Bearing	TEMPORAR Y	Load Bearing
	6.Footprint	180 sqm	180 sqm	120 sqm	120 sqm	120 sqm	150 sqm	90 sqm	150 sqm	120 sqm	180 sqm	120 sqm	150 sqm	150 sqm
	7.Year of Construction	1995	1990	1985	1986	1990	1992	1995	2000	2001	1988	1980	2002	2003
	8.Floor to Floor Ht.	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'	9'	9'	10'
	9. Plot size	20' x 40'	20' x 40'	40' x 30'	40' x 30'	30' x 40'	30' x 40'	15' x 40'	15' x 40'	30' x 40'	30' x 40'	30' x 40'	20' x15'	20':20'
	10.Aspect Ratio (front width: side depth)	1:2	1:2	1.33:1	1.33:1	1:1.33	1:1.33	1:2.66	1:2.66	1:1.33	1:1.33	1:1.33	1.33:1	1:1
	11. Any other													





R-324



R-325



R-326



S-77,R-327



R-328



R-329



S-78



R-330



R-331



R-332



R-333

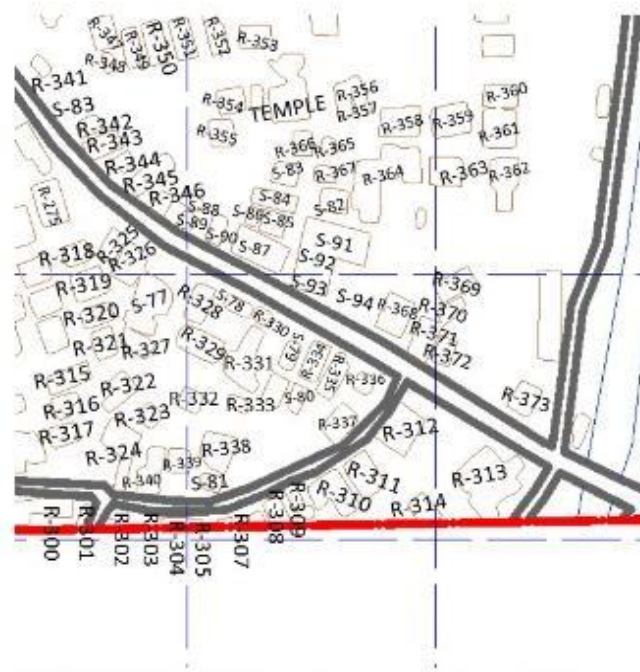


S-79



Fig 35: Details of Survey sheet 34

Source: Self

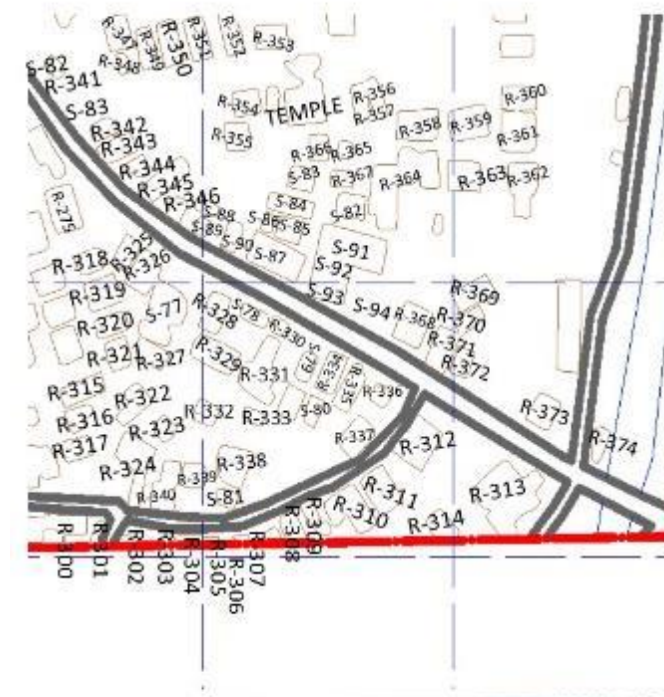


Parameters	R-355	R-356	R-357	R-358	R-359	R-360	R-361	R-362	R-363	R-364	R-365	R-366
1. Building Ht.	35'	35'	25'	40'	38'	30'	30'	28'	20'	40'	20'	15'
2. Facade Treatment	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster
3. Type of Bldng	Residential	Residential	Residential	Residential	Residential	Residential	Residential	Residential	Residential	Residential	Residential	Residential
4. Materials Used	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement
5. Technology used (Load Bearing or Column structure)	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure
6. Footprint	80 sqm	80 sqm	120 sqm	120 sqm	120 sqm	120 sqm	60 sqm	60 sqm	120 sqm	120 sqm	120 sqm	120 sqm
7. Year of Construction	2008	2005	2001	2000	1998	1995	1994	1986	1980	1982	1985	1980
8. Floor to Floor Ht.	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'	10'
9. Plot size	25' x 40'	30' x 40'	40' x 30'	40' x 30'	35' x 40'	30' x 40'	25' x 40'	25' x 40'	30' x 40'	35' x 40'	30' x 40'	35' x 40'
10. Aspect Ratio (front width: side depth)	1:1.6	1:1.33	1.33:1	1.33:1	1:1.15	1:1.33	1:1.6	1:1.6	1:1.33	1:1.15	1:1.33	1:1.15
11. Any other observation												



Fig 36: Details of Survey sheet 35

Source: Self



Parameters	R-367	R-368	R-369	R-370	R-371	R-372	R-373	R-374	S-82	S-83	S-84	S-85	S-86	S-87	S-88	S-89	S-90	S-91	S-92	S-93
1. Building Ht.	28'	18'	28'	30'	30'	28'	28'	30'	12'	12'	12'	12'	12'	12'	12'	12'	12'	12'	15'	20'
2. Facade Treatment	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	Cement plaster	BRICK, TALI	BRICK, TALI	BRICK, TALI	BRICK, TALI	BRICK, TALI	BRICK, TALI	BRICK, TALI	BRICK, TALI	BRICK, TALI	BRICK, TALI	Cement plaster	Cement plaster
3. Type of Bldg	Residential	Residential	Residential	Residential	Residential	Residential	Residential	Residential	SHOP	SHOP	SHOP	SHOP	SHOP	SHOP	SHOP	SHOP	SHOP	SHOP	SHOP	Residential SHOP
4. Materials Used	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement	Brick, RCC, Cement, TALI	Brick, RCC, Cement, TALI	Brick, RCC, Cement, TALI	Brick, RCC, Cement, TALI	Brick, RCC, Cement, TALI	Brick, RCC, Cement, TALI	Brick, RCC, Cement, TALI	Brick, RCC, Cement, TALI	Brick, RCC, Cement, TALI	Brick, RCC, Cement, TALI	Brick, RCC, Cement, TALI	Brick, RCC, Cement, TALI
5. Technology used (Load Bearing or Column structure)	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Column structure	Load Bearing	Load Bearing	Load Bearing	Load Bearing	Load Bearing	Load Bearing	Load Bearing	Load Bearing	Load Bearing	Load Bearing	Column structure	Column structure
6. Footprint	180 sqm	80 sqm	150 sqm	120 sqm	190 sqm	160 sqm	110 sqm	115 sqm	90 sqm	90 sqm	60 sqm	60 sqm	60 sqm	60 sqm	60 sqm	90 sqm	90 sqm	90 sqm	90 sqm	150 sqm
7. Year of Construction	2002	1995	1998	1985	1984	1995	1996	1992	1993	1994	2000	2001	2002	2005	2008	2007	2009	2007	2006	2009
8. Floor to Floor Ht.	10'	10'	10'	10'	10'	10'	10'	10'	10'	9'	9'	9'	9'	9'	9'	9'	9'	9'	10'	10'
9. Plot size	20' x 40'	20' x 40'	40' x 30'	40' x 30'	30' x 40'	30' x 40'	15' x 40'	15' x 40'	30' x 40'	30' x 40'	30' x 40'	30' x 40'	30' x 50'	20' x 40'	20' x 40'	40' x 30'	40' x 30'	30' x 40'	30' x 40'	20' x 30'
10. Aspect Ratio (front width: side depth)	1:2	1:2	1.33:1	1.33:1	1:1.33	1:1.33	1:2.67	1:2.67	1:1.33	1:1.33	1:1.33	1:1.33	1:1.67	1:2	1:2	1.33:1	1.33:1	1:1.33	1:1.33	1:1.5
11. Any other observation																				

Fig 37: Details of Survey sheet 36

Source: Self

ANNEXURE B – QUESTIONNAIRE FOR THE RESIDENTS, USERS, SUBJECT EXPERTS AND PHYSICAL SURVEY OF HOUSEHOLDS

Introduction: A morphological analysis of the settlements around the historic temples of Bhubaneswar is being undertaken as a part of the study to understand the impact of urbanization in the historic settlements of Odisha.

In this regard, we have selected a part of the Ekamra Kshetra for study. The structures which form the core/ focal points of this area are:

Lingaraj Temple	Bindusagar Lake	Ananta Basudev Temple	Mohini Temple
Chitrakarini temple	Suresvara temple	Vithal Deul temple	Sampurna Jaleswar temple
Koti Tirtheswar temple	Kedargouri temple	Mukhteswar temple	Siddheswar temple
Parsurameswar temple	Papanasini Tank		

Name of Surveyor:	
Date of Survey:	
Location	
Time	
Form No	

1. Personal profile of the respondent

Name of the respondent	
Type of respondent	Local resident / Pilgrim or Tourist / Heritage or Civil Society professional
Age (years)	20 – 30 yrs / 30 – 40 yrs / 40 – 50 yrs / 50 yrs and above
Gender	Male/ Female/ Transgender
Status	Single/ Married
Education Qualification	No formal education/Primary/Secondary/Higher Secondary/ Senior Secondary/ Graduate/ Post Graduate
Occupation	Student/ Unemployed/ Self-employed/ Govt. service/ Private service/ Employed for wages
Monthly income	< 5000/ 5000 – 10,000 / 10000 – 50000 / 50000 – 100000 / Above 100000
Years of stay in this area	< 5 years/ 5 – 10 years/ 10 – 20 years/ 20 – 30 years/ Above 30 years

2. Household particulars

Household size	
Ownership of dwelling	Self owned / Rented
Length of residence	< 5 years/ 5 – 10 years/ 10 – 20 years/ 20 – 30 years/ Above 30 years
Purpose of residence	Inherited property / Near workplace / Near religious structures / Convenience in transportation / Government provided facilities / Low land price / Low cost of living
Nature of house	Pucca house - brick walls in cement mortar, RCC roof, columns / Kuccha house - brick walls in mud mortar, GI sheet, tiles, thatch roof / Semi pucca house - brick walls in cement mortar, GI sheet, tiles, thatch roof

	If you are staying in pucca house, when was it built?	< 5 years/ 5 – 10 years/ 10 – 20 years/ 20 – 30 years/ Above 30 years
	Height of the house	Ground floor only / G+1 / G+2 / G+3/ G+4 / Above G+4
	Year since modern infrastructure development commenced	< 5 years/ 5 – 10 years/ 10 – 20 years/ 20 – 30 years/ Above 30 years
	Year of construction of 1 st multistoried apartment in your area (G+4 and above)	< 5 years/ 5 – 10 years/ 10 – 20 years/ 20 – 30 years/ Above 30 years

3. Assessment of development pattern and public infrastructure

	Description	Level of Agreement (1 – Strongly disagree; 2 – Somewhat disagree; 3 – Neutral; 4 – Agree; 5 – Highly agree)				
		1	2	3	4	5
	Availability of appropriate parking					
	Separate movement for pedestrian and vehicles					
	Proper pedestrian movement management					
	Availability of proper seating and resting places					
	Proper public convenience					
	Proper water supply					
	Proper storm water drainage					
	Kuccha road presence					
	Adequate Nodes are present in the area					
	Landmarks are clearly visible					
	The development of the place is organic					
	The area is developed in a planned manner					
	There is no specific pattern of development. It's haphazard.					

4. Assessment of imageability and spatial character of the location

	Description	Level of Agreement (1 – Strongly disagree; 2 – Somewhat disagree; 3 – Neutral; 4 – Agree; 5 – Highly agree)				
		1	2	3	4	5
	Presence of open spaces – courtyards, plazas, public places					
	Presence of major landscape features – parks, green areas					
	Presence of historic building façade					
	Presence of modern style building façade					
	Presence of similar looking buildings (homogeneous)					
	Presence of outdoor dining					
	Presence of mass gathering spaces					
	Presence of sacred buildings					
	Presence of informal activities					
	Presence of windows at street level					

	Presence of windows at 1 st floor level					
	Presence of windows at 2 nd floor level					
	Presence of windows at 3 rd floor level					
	Presence of windows at 4 th floor level					
	Presence of windows above 4 th floor level					
	Presence of big shady trees					
	Adequate facility for access of differently abled					
	Easy availability of public transport					
	Restricted movement of vehicles in daytime for traffic management					

5. Based on your observations, rank the level of prominence for the activities that are undertaken in this area

	Nature of activity	Level of prominence 1 to 5 (1 – Daily ritual; 2 – Periodic ritual – occurrence weekly or monthly; 3 – Yearly ritual ; 4 – Occasional ritual; 5 – Rare ritual)				
		1	2	3	4	5
	Puja at the tanks					
	Holy dip in the tanks					
	Puja at the temples					
	Shivratri Puja					
	Ram Navami Puja					
	Rath yatra					
	Puja during the Hindu month of Shravan					
	Rituals performed during the death					
	Shanidev puja					
	Marriages					
	Bhoga distribution					
	Community eating					
	Local events					
	Market					
	Community events					

6. Based on your observations, rank the level of the activities that effect activities in this area

	Nature of activity	Level of effect 1 to 5 (1 – High effect; 2 – Medium effect; 3 – Low effect ; 4 – Rarely effect; 5 – No effect)				
		1	2	3	4	5
	Puja at the tanks					
	Holy dip in the tanks					
	Puja at the temples					
	Shivratri Puja					
	Ram Navami Puja					
	Rath yatra					
	Puja during the Hindu month of Shravan					
	Rituals performed during the death					
	Shanidev puja					
	Marriages					
	Bhoga distribution					

	Community eating					
	Local events					
	Market					
	Community events					

7. Views and vistas from the street

	Nature of structure / monument	Level of visibility 1 to 3 (1 – Clearly visible; 2 – visible if looked for; 3 – Not visible)		
		1	2	3
	Lingaraj Temple			
	Bindusagar Lake			
	Ananta Basudev Temple			
	Mohini Temple			
	Chitrakarini temple			
	Suresvara temple			
	Vithal Deul temple			
	Sampurna Jaleswar temple			
	Koti Tirtheswar temple			
	Kedargouri temple			
	Mukhteswar temple			
	Siddheswar temple			
	Parsurameswar temple			
	Papanasini Tank			

8. With the development in your area, how is your lifestyle affected?

	Description of affect	Level of Agreement (1 – Strongly disagree; 2 – Somewhat disagree; 3 – Neutral; 4 – Agree; 5 – Highly agree)				
		1	2	3	4	5
	Livelihood is severely affected					
	Positively affected my livelihood					
	Visual linkage between the historic structures is lost					
	Severe traffic issues					
	Lack of proper basic amenities have disturbed the sanctity of this place					
	No change in my lifestyle					
	Flooding of streets					
	Improper sewage system					
	Stampede					
	Rampant cutting of trees leading to environment issues					

9. How would you personally find a resolution to the problems above?

	Description of affect	Level of Agreement (1 – Strongly disagree; 2 – Somewhat disagree; 3 – Neutral; 4 – Agree; 5 – Highly agree)				
		1	2	3	4	5
	For lack of housing, I would add one more floor					
	For lack of housing, I would move to another place					
	Will dismantle my old house to build a new house					
	I have another land in this area where I will build another house					

10. What are your suggestions for improvement of the area?

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PUBLISHED PAPERS

Impact of Urban Developments on the Historic Character of Temple Towns: Insights from Ekamra Kshetra, Odisha, India

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Abstract

The world is becoming increasingly urbanized. Today, more than half of the global population lives in urban areas, up from around one-third in the 1950s and projected to increase up to about two-third in 2050. Following the trend, urbanization is happening in the developing countries like India at an unprecedented rate. Undeniably, this poses a threat to many historical settlements of immense cultural significance. They are part of the heritage known for their unique characteristics, building forms and architectural spaces and define their identity. In the absence of proper planning regulations and urban design guidelines, such rapid urbanizations specifically affect the historical temple towns in India, causing significant changes to their built environments insensitive to their historical and cultural values and significance. In this context, this research examines the impact of urbanization on the transformations of the historic character of the temple towns in India.

The research focuses on the historic core of the Ekamra Kshetra: a town in Odisha, as a case study, revealing the changes in its character. It employs field survey as a technique of gathering data which involves a visual survey and documentations. Over 450 structures have been observed and documented over a three month period identifying specific built-environmental parameters; transformations have been identified and the trends mapped.

It is found that, although few in numbers, the old houses in the town still maintain their traditional character. However, the recent developments produce strikingly different structures disturbing the homogeneous character of this heritage precinct. The paper concludes that Ekamra Kshetra has lost its unique character. It recommends a declaration of heritage zones in India and proper urban design guidelines to sustain the character in any new developments in such historic places. If ignored, it could cause immense damage to the historic character of many places.

Keywords: Urbanization, Urban growth, Historic character, Temple towns, Visual survey, Ekamra Kshetra – India.

Introduction

UNESCO (2023) emphasizes that urban heritage is a social, cultural, and economic asset of any country. While planning in Historic Urban Landscapes (HUL), urban planning should take a comprehensive approach towards the identification, conservation, and management of the historic cores. Assari, Mahesh & Assari (2012) point out that this approach should consider the physical characteristics as well as the socio-cultural and economic values particularly in historic settings. In the context of rapid urbanizations in Asia, the built heritage of the historic environments is often at risk of decline. However, some tourism and associated commercial markets are keeping the conservation of heritage sites alive and well. Despite this, many Asian countries face the pressure of urbanization and must work to protect the identity and continuity of their rich heritage (Chahardowli, Sajadzadeh, Aram & Mosavi, 2020).

According to the Census (2011), in India, the number of cities with a population of one million or more has risen from 18 in 2001 to 65 in 2024. It revealed that between 1991 and 2011, urban population of India has increased from 100 million to 200 million due to widespread urbanization.

It is known that each Indian town has unique characteristics, qualities as well as patterns of land-use. However, uncontrolled developments and increasing urban populations with different needs and aspirations are drastically changing the character of such areas. These changes can destroy the individuality particularly of the historic urban fabric, making all the towns seem similar, eliminating their identities. This is a great decline. In response, some cities have initiated conservation strategies in their master plans for developments. However, as NIUA (2022) points out, most efforts to protect the built heritage and its characteristics in historic areas are weak and limited.

Therefore, we need to identify the factors that hinder the continuity of heritage values in preserving the heritage buildings. The study of Ekamra Khestra, as an example of urbanization strategies that encompass historical as well as modern factors, proposes a conceptual framework to analyze the impact of urbanization on the built heritage and provide empirical guidelines for prohibiting unplanned, haphazard and unwanted changes in heritage buildings in the historic parts of the town. In fact, it is crucial to revive the discontinued heritage essence and identity of the urban fabric in the historic centers from the effects of urbanization.

Building cities that “work” – green, resilient, and inclusive – requires intensive policy coordination and investment choices. Here, the national and local governments have an important role to play to act and shape the future of their developments. Significant increases in population in cities and subsequently developments, and growth in physical footprints are inevitable but policymakers and planners need to develop new guidelines for planning, development and implementations, considering the factors like cultural and architectural heritage.

As Cohen (1999) says “urban planning and conservation should, therefore, be viewed as symbiotic, neither quite complete without the other”. Historic sites are not merely relics of the past; they are living testaments to our shared heritage and identity. They provide a tangible connection to our ancestors, allowing us to understand and appreciate the struggles, triumphs, and cultural achievements that have shaped our society (Zeayter, Mansour & Mansour, 2018).

With this background overview, this study aims to identify the issues and challenges appearing as an impact of urbanization in the historic core of Ekamra Khestra, Odisha, India. The objectives of the study are:

- 1) To conduct a detailed survey over the buildings of the selected study area to understand the changes as impact of urban growth.
- 2) To analyze the issues and challenges appearing due to such urbanization.

Theoretical Framework

This paper deals with two significant concepts: Historic Character and Temple Towns. Historic Character refers to both the visible and invisible traits of a building structure as well as its spatial ensemble. However, more often than not, character refers to the visible aspects of the outer appearances of buildings. Taken

together, characteristics of individual buildings produce the character of an urban space.

In this sense, in as much as all cities have one kind of character or the other, historic cities exhibit what is popularly referred to as 'historic character'. This means that the buildings possess in their buildings such as doors, windows, and other embellishments, that have been created in them on the basis of cultural and building practices of a previous period. Indeed, they not only represent that period but also record nuances of values, attitudes, materials, skills and symbolic meanings associated with those elements during those periods. In other words, they signify the identity of that building or a the city as well as the people who occupied them. Such buildings are often referred to as 'heritage' because they have been inherited by the present generation from the past.

Patrick Geddes, a renowned city planner of the 19th century argued against the demolition of heritage buildings in the historic town of Madurai, India after conducting a detailed physical and visual survey and an analytical appraisal of the history of the town (Rao-Cavale, 2017). Building on Geddes' ideas, Cohen (1999) advocated a contemporary style adapted to the built heritage of the historical town. He argues that the preservation of the architectural, aesthetic, historical, and cultural significance of built heritage is crucial in urban planning for the current as well as the future generations.

The unique character of a city is largely dependent on the conservation of existing built heritage and limiting new interventions in architecture and public spaces. Haddad (2024) points out that it is recommended to thoroughly document the heritage attributes of houses in historic towns to enumerate their features and monitor changes due to modernization. However, many historical-heritage towns are currently facing pressure for urbanization and development, which may lead to discontinuity in architectural style and loss of the harmonious relationship between the old and the newly built environments. In fact, Orbasli (2008) argues that urbanization poses a threat to both the physical and socio-cultural aspects of heritage towns. Interestingly, Beatriz and Francisco (2018) expands on research related to historic cities by examining various factors, including socio-cultural, economic, historical, and physical. The key performance indicators so identified are as follows.

Table 1: The Identified Key Performance Indicators

Source: Authors

Sl. No.	Key Performance Indicators	Sources
1	Height of the building	(Lourenco, 2013)
2	Existing treatment of the façade	(Menon, 2014)
3	Category (use) of the building	(Mekonnen, Bires & Berhanu, 2022)
4	Material used for construction	(Abdul Huq, Puthuvayi, 2024)
5	Construction technology used (RCC or Load bearing structure)	(Menon, 2014)
6	Footprint of the structure	(Attarian, Safar Ali Najar & Khaksefidi, 2022)
7	Tentative year of construction	(Chen, Ludwig & Sykes, 2020)
8	Floor to floor height as visible	(Attarian, Safar Ali Najar & Khaksefidi, 2022)
9	Approximate size of the plot	(Lourenco, 2013)
10	Aspect ratio of the building (front width : side depth)	(Abdul Huq, Puthuvayi, 2024)
11	Any other significant observation	(Mekonnen, Bires & Berhanu, 2022)

Review of Literature

Research into the impact of contemporary urban developments on the historic character of cities are in abundance. However, those specific to the temple towns and more specifically Ekamra Kshetra, in Odisha, India are rare. For example,

Kiruthiga and Thirumaran (2019) investigate the effect of urbanization on the historical buildings in the context of Kumbakonam, India using an ordinal regression model. They reveal physical, socio-economic and cultural factors due to which significant transformations can be observed in the historic characteristics of the place studied. They argue that there should be Local Development Plans (LDP) in place for immediate implementation to restrict the unplanned growth and to preserve the historic character of this town.

Similarly, Gowthami (2023) presents south Indian temple towns as socially and culturally rich unique built fabric and how such historic cores are affected by urbanization and under development pressures. He has examined the visual influence of south Indian temples on the built environment and has adopted a statistical approach using a regression model.

Sasidhar, Jayanthi and Nallusamy (2021) present transformations of historic character at settlement level as well as street level in Kachipuram in India. They present changes of land use due to commercial tourism, introduction of new commercial establishments, appearance of new building types, abundant historic structures, pollution, wastage of natural resources, unplanned slum-like growth etc. observed as transformations. At the street level, change of skyline is observed. Previously it has been distinct with the glorious presence of Gopurams. However that is broken by the new high-rise structures.

In comparison, Kapoor, Sehgal and Mathur (2022) note the spatial transformations in Vrindavan in India. They observe the transformations due to urbanization. They argue how to modernize the historic fabric while preserving its historic essence and integrity. They reveal that an increase in religious tourism has caused such transformations in the built fabric due to increased accessibility, movement, and increased modes of transportation.

At the same time, Chandan and Kumar (2019) outlines the issues and challenges faced by the pilgrim cities based on a literature review and a case study. They especially examine the core areas of the temple and how the character of these places have been affected over the past decades. They argue that heritage conservation should be taken as a key theme in urban planning and it should be dealt through master plans of the cities. They analyze various existing schemes and policies of heritage conservation and recommend strengthening the capacities of planning agencies, especially the involvement of the local stakeholders.

Adding to these, Vinod, Kumar and Agrawal (2023) propose that there is a need to revitalize the temple towns of India to ensure planned conservations of heritage and development in an organized manner. They adopt UNESCO's HUL approach to find out indicators and assessment techniques for the revitalization of the temple cities.

Moreover, Kashkari and Brar (2023) evaluate the relationship between historic urban form and sustainability parameters and reveal how the traditional urban form is affected by the transformations of the urban fabric. It can be seen that urbanization plays a significant role in these developments. As Shrestha and Tiwari (2021) examining the urbanization scenario of Tokha, a traditional town of Nepal and assess the transformations in this town due to urbanization. They use both qualitative and quantitative methodologies and reveal specific physical, economic and socio-cultural factors that cause noticeable transformations in this historic town. They recommend the implementation of a Local Development Plan (LDP) to restrict such growth and promote cultural preservation. Thus the direct impact of urban developments on heritage cities is clear. As Potdar, Namrata and Sami (2018) narrate how the development pressure in Chamba, a historic town in the Himalayas has a direct impact on traditional practices and cultural landscapes, they change the character of heritage cities. They argue that there is an urgent need to balance transformations due to urbanization and promote the preservation of heritage.

Gupta and Gahalot (2023) investigates the impact of globalization on religious tourism and how it transforms the city's landscape. Taking a case of Vrindavan, India they explain how globalization has changed the essence of religious tourism in the city. They recommend for the sincere implementation of modern regulatory framework for the historic precincts in order to preserve its sacredness.

An exploratory study is conducted by Vishaliny and Kaur (2024) on Srirangam town, India which delves into the challenges faced by the town which led towards changes in the temple landscape and its immediate surroundings. They discuss on several retrofitting strategies which can help into conserving the cultural, ecological and historical significance of the town and can promote sustainable urban development. They infer that similar challenges are faced by the temple towns across the country and highlights the need for innovative strategies to safeguard cultural heritage.

Udeaja et al. (2020) in their study on Surat, India highlights the challenges faced by the historic precincts of the town due to rapid urbanization, increasing housing demand and socio-cultural and climate changes. With the help of in-depth semi-structured interviews and focus group discussions they reveal that there is inadequacy of conservation policies in the country. The study recommends that heritage policies need to be integrated with planning domain. The regulations need to be in place to preserve the cultural assets.

Research Methods

This research employs a case study method. It adopts a visual survey as a technique to gather data on the building characteristics of the case study. The detailed visual survey has been conducted for over 3 months ensuring that each street has been visited and all the abutting houses in the selected case study have been documented. In fact, Over 450 structures have been surveyed over this period of time. The survey is conducted by taking photographs of each building, which are then analyzed to understand the visual character of the place as a whole. According to Watson (2003), visual survey is a popular method in urban design to gather data pertaining to built-environments.

“A visual survey in urban design is an examination of the form, appearance, and composition of a city, an evaluation of its assets and liabilities. A visual survey also enables the urban designer to see where the city needs reshaping..... In the case of a city, the analysis is a diagnosis of the city's component pieces, to see the relations between these pieces and to assess their condition,”

Badita, 2012: 212

The research analyzed the current status on the basis of identified physical parameters, as elaborated in the theoretical framework. The key performance indicators / parameters have been identified using secondary resources, as elaborated in the Table 1 presented before. Based on these parameters, the buildings have been surveyed in detail and analyzed to understand their transformations as an impact of urbanization.

The Case Study

Ekamra Khetra is a historic town located in the Indian state of Odisha and has been chosen as the study area. Ekamra Kshetra is a temple town famous for its historic architecture and cultural heritage, which has been ruled by legendary kings for centuries. According to Seymour (1980), these kings have left their mark on the town by building grand palaces, residences, and religious buildings. Until the British colonial period, Ekamra Kshetra maintained its unique style and individual character of the urban fabric. Many temples in the town exhibit the architectural styles of the period during which the kings ruled, while the residential and commercial buildings

showcase the vernacular and colonial architecture styles, respectively (Sarangi, 2017). Even after India's independence in 1947, the town has been able to strike a balance between development and preserving its rich heritage character.

Today, the town is facing the growing pressure of urbanization causing the loss of its historical character. The rampant growth and modernization in the historic center of the town are replacing its heritage characteristics with contemporary designs (Prahraj, 2012). The physical settings, especially the buildings, are being irreversibly altered, and with their passing, the overall fabric and essence of the place will soon only be a memory preserved in a few remaining structures and photographs (Mishra, 2011). The visual aspects of the town, such as the appearance of its buildings against the skyline, the materials used in their construction, and the architectural elements, are a part of its tangible value and heritage (Mishra, 1989).

Moreover, the urbanization process with the development pressure is increasing the occupancy rate and land value, leading to a change in the building use and modification of the buildings. This intervention in global trends results in the loss of the built heritage settings of the town. It is known for its businesses that have been passed down through generations. While some shops maintain the traditional style, others have been modified to follow the current trends. In recent decades, land values have increased, which has led to the building owners partitioning their buildings and renting them for commercial purposes. As a result, the streetscapes and skylines have been significantly impacted. In order to preserve the significant built heritage of the town, we must identify the factors that cause these changes and take measures to balance urbanization with historical heritage settings. Undeniably, the careless disregard of the potential adverse effects of the new interventions due to urbanization threatens the existing urban fabric.

The town comprises a number of municipal administrative wards and a certain number of streets. It covers an area of 4.55 sq. k.m., with a total of 70 percentage of land used for residential and commercial purposes. Moreover, the municipal administration area houses over 100 temples— both small and large. The emperors of Ekamra Khetra Town have designed a distinctive style of architecture for the temples and urban landscape. This unique style adds to the divine and magnificent composition of the town, which is manifested in its temples and sacred water tanks. As a result, the town has become an important native settlement with a rich historical significance (Jha, 2018).

The study area comprises several streets located in the historic center of Ekamra Khetra. These streets are home to numerous buildings, sacred water tanks, and key temples (Fig. 1). The Sahasralinga water tank retains a significant religious importance. During the festival, the key temples follow a processional route that connects the sacred water tanks. The major city road, Lewis Road that runs through this stretch of the town is also its major commercial corridor. As a result, most of the land-use changes and developments have occurred along this road. It is important to note that the selected study area has several heritage features that are at risk of disruption due to commercial developments.

To delve deep into the impact of urbanization in Ekamra Kshetra, a specific area was chosen to carry out a detailed physical, social and morphological survey and analysis. An area covering around 3,24,837 square meters has been selected with major access roads defining the boundary of the survey area. As per the Bhubaneswar CDP map, the municipal map and the imposition of google images, the area was mapped. The selected area contained the significant temples of Lingaraj, Chitrakarini, Suresvara and Mohini. This area was chosen to ensure that at least one temple is protected by the Archaeological Survey of India (ASI) and at least one temple was protected under the State Department of Archaeology.

While, Lingaraj and Chitrakarini are listed as protected structures with the ASI, Surveswara and Mohini are listed with the State Archaeology. In the selected

area, the Lingaraj & Chitrakarini cover an area of 26,618 square meters, Suresvara temple with its tank covers 12,336 square meters and the Mohini Temple covers 354 square meters. A total of 33,716 square meters is covered by the approach roads and the pathways.

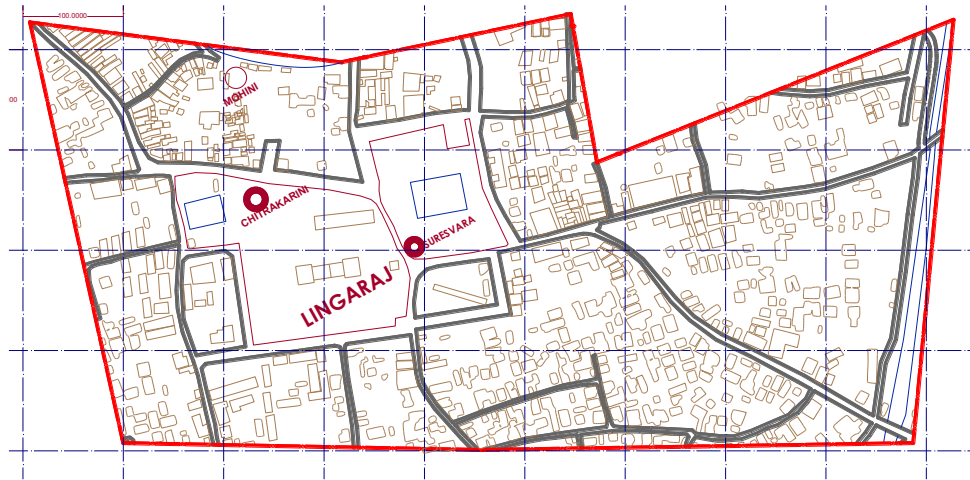


Fig. 1: The Case Study Area: The Historic Core of Ekamra Kshetra
Source: Authors

Data Analysis and the Findings

Survey data is presented for one stretch of the area (Fig. 2-4, Table 2), likewise, other streets and the abutting buildings have been documented and analyzed with respect to the selected parameters. From the survey and analysis, followings outcomes / findings are made.

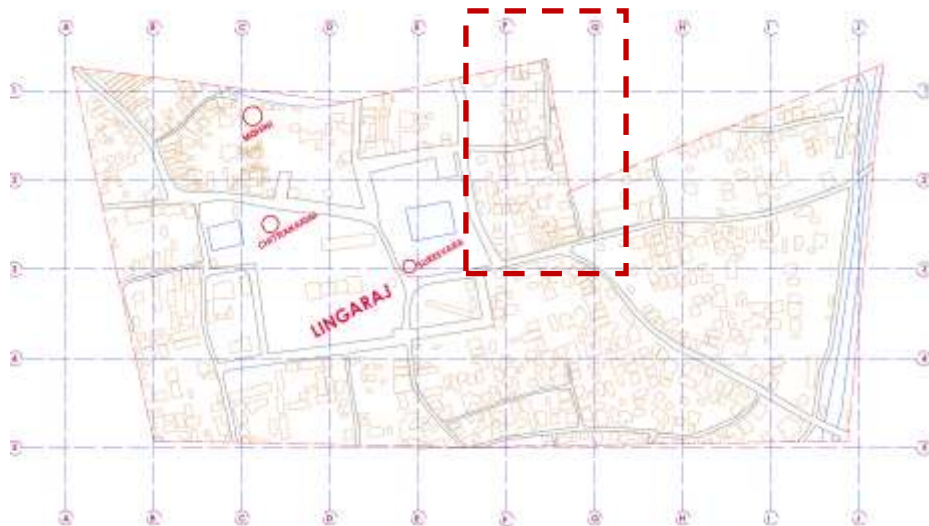


Fig. 2: Key Plan of the Sample Survey Area
Source: Authors



Fig. 3: Detailed Plan of the Sample Survey Area
Source: Authors



Fig. 4: Pictures of Buildings in the Survey Area
Source: Authors

Table 2: Analysis of the Buildings on the basis of the Identified Key Performance Indicators

Source: Authors

Parameters	C-1	R-61	R-62	R-63	R-64	R-65	R-66	R-67	R-68	R-69	R-70	R-71	R-72
1. Building Ht.	15'0"	10'0"	10'0"	20'0"	10'0"	22'0"	8'0"	20'0"	30'0"	10'0"	30'0"	9'0"	40'0"
2. Facade Treatment	Stones,	cement, plastering	Concrete, Cement, Plastering	Concrete, Cement, Plastering	Concrete, Cement, Plastering	Concrete, Cement, Plastering	Concrete, Cement, Plastering	Concrete, Cement, Plastering	Concrete, Cement, Plastering	Concrete, Cement, Plastering	Concrete, Cement, Plastering	Concrete, Cement, Plastering	Concrete, Cement, Plastering
3. Building Use	Commercial	Residential	Residential	Residential	Residential	Residential	Residential	Residential	Residential	Residential	Residential	Residential	Residential
4. Materials Used	Stone, Sand, Cement	Brick, Sand, Cement	Brick, Sand, Cement	Brick, Sand, Cement	Brick, Sand, Cement	Brick, Sand, Cement	Brick, Sand, Cement	Brick, Sand, Cement	Brick, Sand, Cement	Brick, Sand, Cement	Brick, Sand, Cement	Brick, Sand, Cement	Brick, Sand, Cement
5. Technology used (Load Bearing or Column structure)	Load bearing	Column Structure	Column Structure	Column Structure	Column Structure	Column Structure	Load Bearing	Column Structure	Column Structure	Column Structure	Column Structure	Load Bearing	Load Bearing
6. Footprint	200 sqm	90 sqm	120 sqm	120 sqm	120 sqm	120 sqm	NA	120 sqm	120 sqm	NA	120 sqm	150 sqm	120 sqm
7. Year of Construction	2015-16	2019-20	2018-19	2009-10	2009-10	2018-19	2012-13	2010-11	2011-12	2011-12	2008-09	2007-08	2019=20
8. Floor to Floor Ht.	14'	15'	11'	10'	10'	12'	NA	10'	10'	NA	10'	10'	10'
9. Plot size	80' x 30'	30'x 30'	30' x 40'	30' x 40'	30' x 40'	40' x 30'	NA	30' x 40'	40' x 30'	30' x 50'	30' x 40'	50' x 30'	30' x 40'
10. Aspect Ratio (front width: side depth)	2.67:1	1:1	1:1.33	1:1.33	1:1.33	1.33:1	NA due to temporary nature	1:1.33	1.33:1	NA due to ongoing work	1:1.33	1.67:1	1:1.33

Nature of the Houses

As found from the survey analysis (Fig. 5), the old houses in the vicinity still maintain their traditional character. However, the houses built in the last two decades are mostly RCC structures with no use of traditional materials and character on facades. The most recent developments / the upcoming buildings have also used modern materials. Therefore, no traditional character can be noticed in their facades. It is evident that there is no regulation on the use of traditional building materials for such a heritage precinct. This needs to be augmented on an urgent basis to create certain homogeneity in the character of the buildings.

Building Height

As found from the survey analysis (Fig. 6), majority of the buildings in the vicinity are G+1 or G+2 structures. No structure with more than 6 stories is observed in the area. It is evident that there are some height restrictions for the area. However, with respect to the street width, the structure should not be more than G+2. All the recently constructed buildings have utilized the maximum FAR and have risen up to G+5, which violates the distinct skyline of the heritage structures.

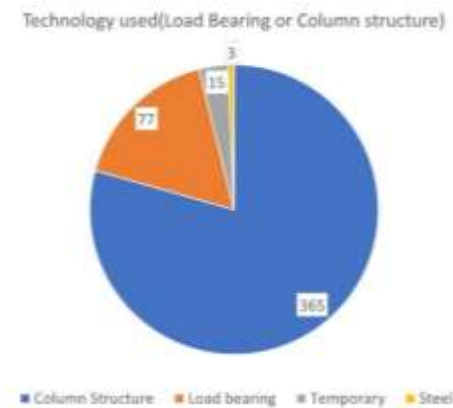


Fig. 5: Nature of House Surveyed
Source: Authors

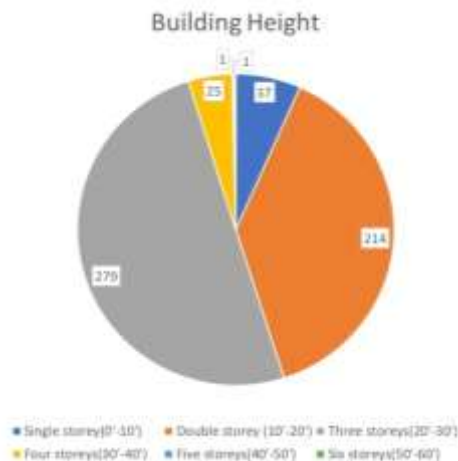


Fig. 6: Building Height Surveyed
Source: Authors

Façade Treatment

As found from the survey analysis (Fig. 7), the facades of the recent developments or the newly developed buildings are coming up with completely a modern appearances with the usage of modern materials and façade treatments. The traditional façade character is totally

absent in the area. The buildings surveyed in the area are largely modern structures with little or no respect for the heritage structures standing nearby and hence are built using all the modern facades without any sense of homogeneity. Nor has there been any special building norms or agency created such as DUAC (Delhi Urban Arts Commission) which can control the building facades and their external appearance to develop some homogeneity in the space while respecting the heritage of land.

Building Footprint

As found from the survey analysis (Fig. 8), although the older buildings are of smaller footprint, the upcoming buildings are of larger footprints. There are no guidelines regarding plot amalgamations in the vicinity. In recent times, developers amalgamate the plots for high-rise developments. Such larger footprints create gigantic developments, violating the skyline of the heritage precinct. They break the homogeneity of the development in the area and along the streets leading to the temples.

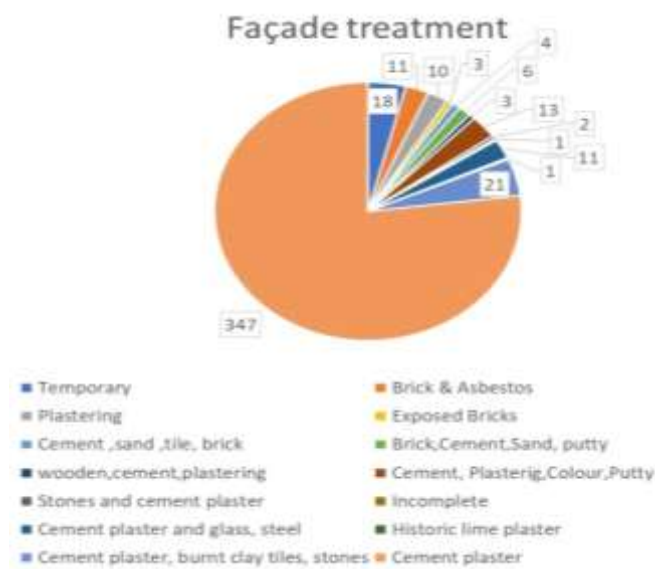


Fig. 7: Façade Treatment Surveyed
Source: Authors

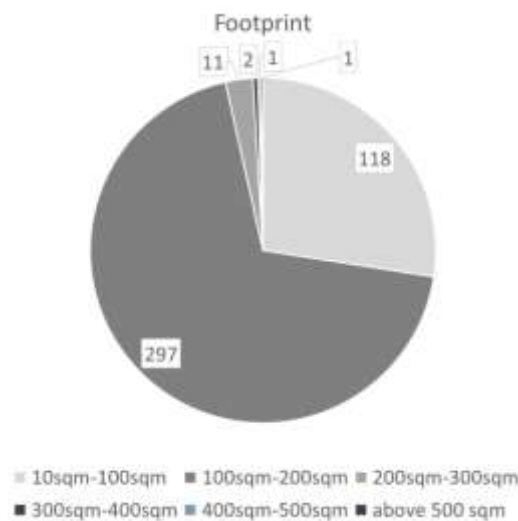


Fig. 8: Building Footprints Surveyed
Source: Authors

Building Use

As found from the survey analysis (Fig. 9), the older houses are of mixed-use in nature, whereas the recently developed buildings are commercial in nature. As mixed-use buildings like commercial and residential mix buildings contribute towards more vibrant street character and public realm, mixed-use could be mandatory through implementation of Local Development Plan.

Year of Construction

As found from the survey analysis (Fig. 10), most of the older houses have been rebuilt / reconstructed using modern materials and construction techniques in the last decade. Such fast change / transformation in the built environment in such heritage precinct has a direct impact on visual character of the place. Strict building guidelines on upcoming developments should be in place.

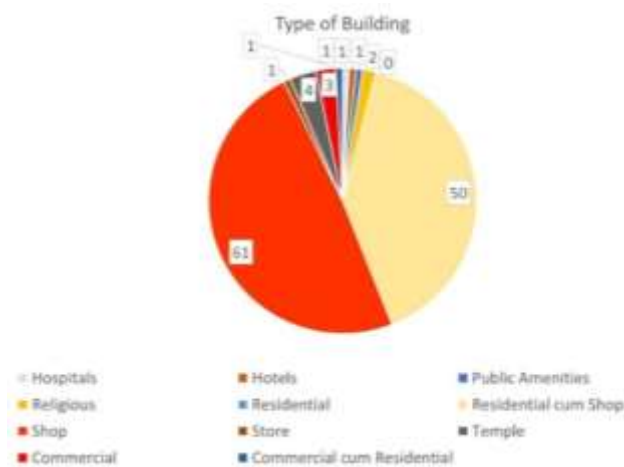


Fig. 9: Building Use Surveyed
Source: Authors

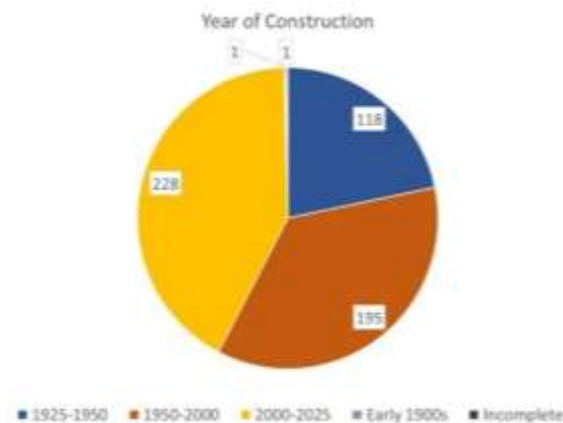


Fig. 10: Year of Construction of the Buildings Surveyed
Source: Authors

Material Used

As found from the survey analysis (Fig. 11), the modern materials used for the façade treatment for the newly constructed buildings has a direct impact over the old, heritage character of the place. It is argued that there should be a list of allowed materials at least for the building facades to maintain the character.

Floor to Floor Height

As found from the survey analysis (Fig. 12), there is no specific guideline regarding the floor to floor heights in the area. While the older buildings maintain a height up to 10', the newer buildings create lower floor to floor height. Sometimes, the newly built commercial buildings create a double height up to 18'. This unevenness in floor to floor heights directly impacts the street character. The visual lines of the streetscape are hampered due to such unevenness in floor to floor height. To create a homogeneous street character, strict guidelines needs to be implemented in this regard.

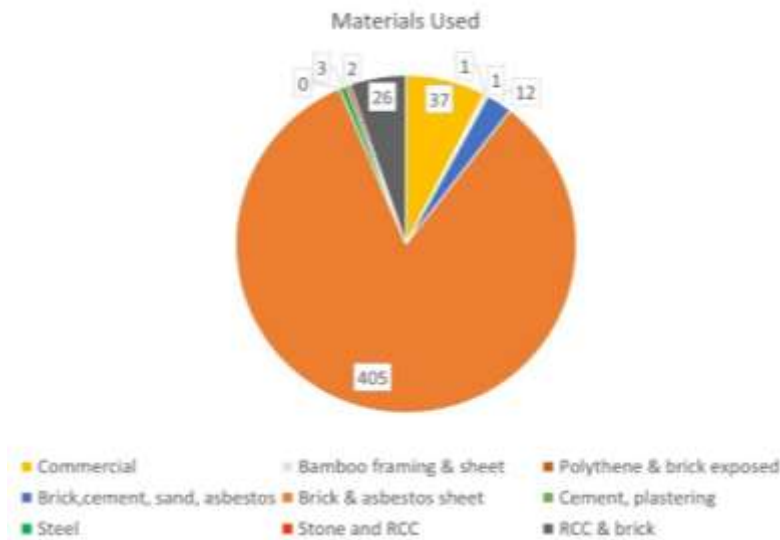


Fig. 11: Materials Used Surveyed

Source: Authors

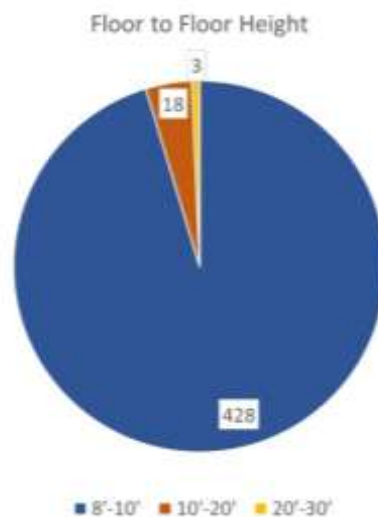


Fig. 12: Floor to Floor Height Surveyed

Source: Authors

Building Aspect Ratio

As found from the survey analysis (Fig. 13), while the older houses have a smaller frontage with a greater depth, the new buildings have huge frontages. This also impacts the street character in terms of homogeneity. Building guidelines should be in place at least in terms of frontage / front façade length to maintain a homogeneous street character in such heritage precinct.

Plot Size

As found from the survey analysis (Fig. 14), the older houses take a small plot, whereas the recently built houses are products of plot amalgamations. They are built in larger plots. This also creates a heterogeneous built environment, which is not desirable as per the sustainable urban form principles.

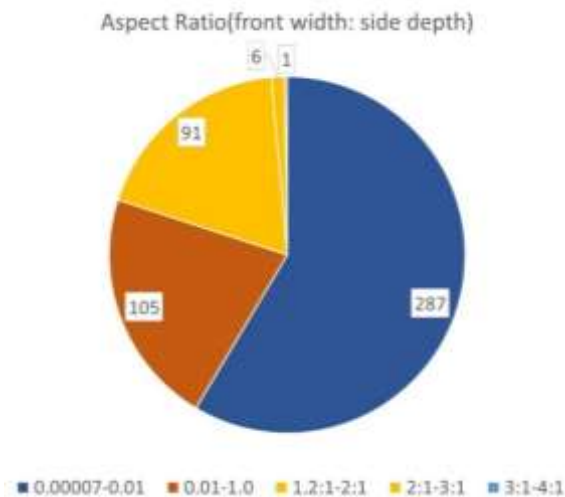


Fig. 13: Building Aspect Ratio Surveyed
Source: Authors

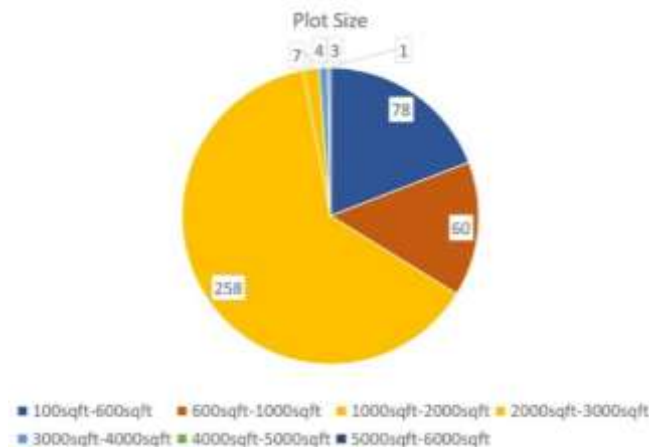


Fig. 14: Plot Size Surveyed
Source: Authors

Conclusions

In this study, the aim was to assess the impact of urbanization on the historic core of the selected study area, i.e. Ekamra Khestra, Odisha. To achieve this, some key performance indicators / physical parameters were identified from the literature review on the basis of secondary resources. Subsequently, a detailed visual survey of over 450 structures have been conducted on the basis of these parameters. Following the completion of the detailed visual survey of over 80 acres of populated area which contains four significant temples – the Lingaraj, Chitrakarini, Mohini and Suresvara, the inputs were carefully studied and outcomes were analyzed to highlight the key issues which needs to be addressed.

It is revealed that the old houses are few in numbers, which still maintain the old, historic character of the place. Majority of the houses, particularly built in the last decade have

been developed using bigger plots with bigger footprints and with greater heights. Their use is also transformed from mixed-use to completely commercial in nature.

The created skyline, façade treatment of these modern buildings do not respond towards the heritage character of the place. Therefore, it is recommended that detailed urban design guidelines need to be developed and implemented which can restrict such unplanned, haphazard, meaningless developments under the pressure of urbanization. Urban growth can be allowed in such heritage precincts, but in a meaningful manner. The guidelines may include building heights, plot sizes, widths of the building frontages, materials to be used, especially for front façades, façade treatments, color schemes etc. to maintain the essence of this heritage precinct.

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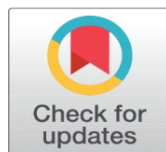
IMPACT OF URBANIZATION IN EKAMRA KSHETRA, ODISHA: PARAMETRIC ANALYSIS OF VARIATIONS

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ABSTRACT

Urbanization is a complex mechanism of development of spaces which have adversely affected the historic towns in India. Ekamra Kshetra, Bhubaneswar is one such historic settlement dating back to the 12th century CE. The settlement has been dotted with several temples built across the 12th to 18th century by the various dynasties who ruled Odisha and Ekamra Kshetra was considered as a pious religious centre with the settlements developed around the temples. With the transformation of Bhubaneswar into a modern planned city of independent India, in 1948, the original planned city was planned earmarking the historic part as a separate entity with minimal effect of urban sprawl. However, with the advent of industries and population explosion in Bhubaneswar, especially after the 1980s, the historic part of the city has been at the receiving end of rapid urban sprawl, with massive modern constructions which have severely affected the original spatial nature and eventually the historic fabric of the Ekamra Kshetra has been lost. This paper attempts to undertake an analysis of these change in the historic fabric through definition of various parameters following a detailed visual survey of a selected area in Ekamra Kshetra. Based on the findings, a regression and ordinal analysis was undertaken to understand the calculate the likelihood of change in the original fabric of the historic town.

Keywords: Ekamra Kshetra, Urbanization, Built Heritage, Historic Settlements

1. INTRODUCTION

As one of the world's fastest-developing nations, India grapples with the impact of progress on its ancient urban centers. Cities like Banaras, Prayagraj, Madurai, Mahabalipuram, Kolkata, Patna, and Delhi are living testaments to centuries of history and transformation. However, urban development in these historic locations, especially in recent decades, has caused them to grow into sprawling metropolises. This rapid expansion often sacrifices the distinctive qualities that

once defined these urban cores, causing the rich history of many ancient cities to fade under the pressures of modern development [Praharaj \(2012\)](#). Our cities are slowly losing their heritage, with many historically significant zones now in disrepair. Originally, diverse religious and socio-cultural practices led to the creation of various sacred structures and their surrounding settlements. Over time, temples became central to civic and social life. These religious precincts in temple towns weren't just places of worship; they also served as cultural and philosophical hubs, actively boosting the city's economy through retail and commercial activities. [Rajakumari and Sivakumar \(2019\)](#) Odisha boasts a rich and diverse cultural heritage, evidenced by its Hindu, Buddhist, and Jain sculptures. References to Kalinga and Odra, ancient names for the region, appear as early as the Mahabharata [Das \(2019\)](#). The capital city of Bhubaneswar gets its name from Lord Shiva, its presiding deity, who is known as "Tribhuvaneshwara"—meaning "The Lord of the three worlds." This name was popularly shortened to Bhubaneswar, giving the city its identity. As a significant religious hub, the temple town was also famously called "Ekamra Kshetra." According to legends, its sanctity originates from a time when a single mango tree stood over a Shivalinga. This religious center developed around that spot, culminating in the 11th-century Lingaraja Temple. This fully established Ekamra Kshetra as a major center of Saivism (Shiva culture). Despite centuries of change, Bhubaneswar remains a vibrant pilgrimage destination in Odisha [Mishra \(1989\)](#). The remains of Ekamra Kshetra — including Buddhist, Jain, and Hindu monuments spanning from Sishupalgarh Fort to the Khandagiri caves — still provide rich historical evidence. Ancient ponds and water bodies, crucial to Odishan societal traditions, are also present alongside the temples. These monumental developments suggest the historical formation of 'Asta-ayatana' (eight sacred complexes), strategically located based on geography. Regrettably, modern urban planning has entirely ignored these vital elements, effectively erasing the social and religious contours of this historic settlement. To effectively preserve our heritage buildings, we must identify what obstructs the continuity of their heritage values. This study of Ekamra Kshetra integrates historical and modern urban strategies, introduces a conceptual framework. This framework aims to analyse urbanization's impact on built heritage for offering practical guidelines to prevent unplanned, haphazard, and unnecessary alterations to historic buildings within the town's older areas. Ultimately, it's vital to revive the lost heritage essence and identity of urban historical centers from the damaging effects of urbanization. To achieve the objective of this study, key performance indicators/parameters were identified using secondary resources. The identified parameters are. Height of the building [Lourenço \(2013\)](#), Existing treatment of the façade [Menon \(2014\)](#), Category (use) of the building [Mekonnen et al. \(2022\)](#), Material used for construction [Huq and Bhattacharya \(2024\)](#), Construction technology used (RCC or Load bearing structure) [Menon \(2014\)](#), Footprint of the structure [Attarian et al. \(2022\)](#), Tentative year of construction [Chen & Shen \(2020\)](#), Floor to floor height as visible [Attarian et al. \(2022\)](#), Approximate size of the plot [Lourenço \(2013\)](#), Aspect ratio of the building (front width: side depth) [Huq and Bhattacharya \(2024\)](#), Any other significant observation [Mekonnen et al. \(2022\)](#). Based on these parameters, a comprehensive visual survey was conducted over three months. During this period, every street in the selected study area was visited, and all abutting houses were documented. In total, over 450 structures were surveyed.

2. LITERATURE STUDY

Urbanization is the process by which a society becomes more urbanized, meaning a greater proportion of its population lives in towns and cities rather than in rural areas. It's a fundamental shift that brings about profound changes in a country's economic, social, cultural, and environmental landscape [Davis \(1965\)](#). [Kiruthiga and Tamil \(2019\)](#) in their study provides empirical evidence of how the multifaceted process of urbanization can erode the historical integrity of places like Kumbakonam. It then offers a concrete and urgent policy recommendation for local authorities to mitigate these negative impacts and safeguard cultural heritage through structured planning. [Sasidhar and Narayanasamy \(2021\)](#) in their study provide crucial empirical evidence for the specific ways in which urbanization, particularly driven by commercial tourism, poses a direct threat to the tangible and intangible heritage of historic towns like Kanchipuram in India. The detailed observations, from land-use changes to the dramatic alteration of the skyline, underscore the urgency of implementing effective heritage conservation and urban planning strategies to balance development with the preservation of cultural identity. [Chandan \(2019\)](#) provide a valuable macro-level perspective and policy advocacy for integrating heritage conservation firmly into the core of India's urban planning efforts, particularly for its vulnerable pilgrim cities. [Gupta \(2024\)](#) offer a crucial perspective on how globalization, by altering the nature of religious tourism, poses a significant threat to the authenticity and sacredness of places like Vrindavan, underscoring the urgent need for robust regulatory measures to preserve their unique spiritual and historical identity. [Vishaliny and Krishnan \(2024\)](#) provide an insightful look into the challenges confronting Srirangam and, by extension, other Indian temple towns, advocating for integrated, innovative, and sustainable solutions to preserve their invaluable heritage. The study by [Udeaja et al. \(2020\)](#) on Surat, India, provides a critical perspective on the systemic issues affecting urban heritage in the country. It provides a strong argument that the challenges faced by India's historic urban areas are not merely localized issues but stem from a broader policy and planning vacuum. Their work underscores the urgent need for a fundamental reorientation of urban planning to prioritize heritage conservation and empower robust regulatory frameworks.

3. RESEARCH METHODOLOGY

This research adopt a visual survey method after enumerating the parameters. Based on the parameters, a key information indicator is prepared for detailed study of the each of the structures in the selected study area. After collection of data, the information is put together to prepare a chart. Based on the chart, a coding is developed to analyse the level of change viz., nominal, medium and significant. Based on these coding, the results are segregated and then model for regression and ordinal study in statistical methods are adopted to determine the level of change.

3.1. STUDY AREA

The Ekamra Kshetra – a settlement originated in the 12th century, which contained the Lingaraj Temple, Bindusagar and other significant temples was chosen as the study area. As indicated in [Figure 1](#), an area covering over 3 lakhs square metres, encircling four significant temples – the Lingaraj, Chitrakarini, Mohini and Suresvara was considered for a detailed visual site survey. Significant lake, water tanks & Temples such as Bindusagar, Ananta Basudev etc are in the

immediate vicinity of the selected area & effect the activities of the area to a great extent. Parameters of morphology were shortlisted and accordingly a set of analytical questions was prepared for the survey. To further corroborate the study, a set of questionnaires was prepared for response from various users which included users, residents and subject matter experts. The selected area as shown in Figure 1, contains a rich concentration of historically and culturally significant landmarks. It includes the renowned Lingaraj Temple, Suresvara Temple, Mohini Temple, Chitrakarini Temple and the Papanasini Tank, each of which holds immense religious and architectural importance. Additionally, the site is situated in close proximity to other key heritage structures such as the Ananta Basudeb Temple and the Bindusagar Lake, creating a unique cluster of sacred monuments and water bodies. Together, these elements form the core of the ancient human settlement known as Ekamra Kshetra, which has been a focal point of spiritual and social life for centuries. Over time, this area has seen significant development, reflecting its continuous relevance and vitality across different historical periods. Recognizing its cultural and historical value, several initiatives have already been undertaken, and more are being proposed, aimed at the conservation, restoration, and sustainable development of this heritage zone to ensure its preservation for future generations. Following the completion of the detailed visual survey of populated area, the inputs were carefully studied and outcomes were analysed to demarcate, highlight the key issues which needs to be addressed. The visual study was then analysed based on ordinal methodology to determine the extent of change or the impact of urban in correlation to the selected parameters. The following part of this paper provides an in-depth assessment conducted of the analysis for each parameters mentioned above.

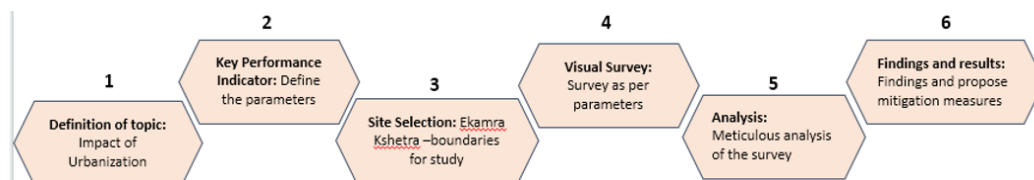


Figure 1



Figure 1 Study Area and its vicinity; Source Bhubaneswar CDP 2011

4. ANALYSIS AND DISCUSSION

1) Building height

This parameter was selected to identify the quantum of changes in building height across the surveyed buildings, in order to assess whether the impact of urbanization is directly proportional to the number of taller buildings observed. It is important to note that in this ordinal regression model, the building height is not in the form of categories but as numerical values denoting actual height of the building.

Figure 2



Figure 2 up to 3m

Figure 3



Figure 3 3.1-6m

Figure 4



Figure 4 6.1 & above

As mentioned in the [Figure 2](#), [Figure 3](#), [Figure 4](#) the building height has been classified into 3 category - (1) up to 3m (2) 3.1– 6m (3) 6.1 & above. This is a simple classification of buildings based on their height, which can help in understanding the urban structure or development pattern of an area. Up to 3 meters category are low-rise buildings or single-storey structures. Usually just the ground floor. These are found in traditional residential areas or small shops. 3.1 to 6 meters category buildings typically have two storeys — Ground + One Floor (G+1). Slightly taller than the first category. These are found in moderately developed areas or expanded homes. The 6.1 meters and above category are multi-storeyed or high-rise buildings (G+2 and more). Often found in urban or commercial areas where space is limited, so people build vertically. These may include apartments, offices, or hotels. [Figure 6](#) represents the building heights on the map.

Figure 5

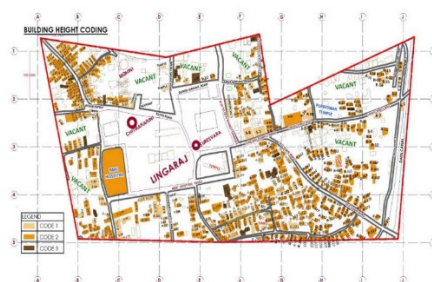


Figure 5 Building Height Colour Coded in Map

Table 1

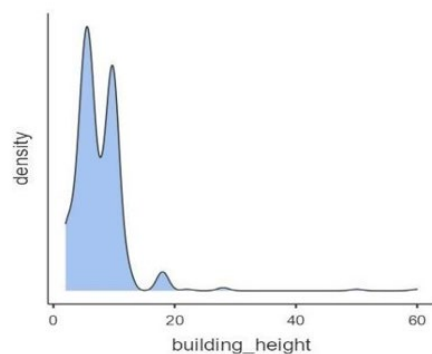


Table 1 Frequency Distribution and Density Plot of Building Height

Table 2

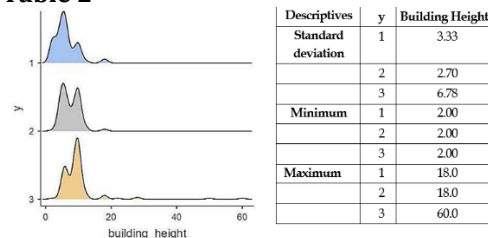


Table 2 Frequency Distribution and Density Plot of Building Height (X1) for Different Build Categories 1,2 And 3

Observation: The above analysis [Table 1](#) and [Table 2](#) determines that the buildings heights are mostly concentrated within the 20 metres category. The standard deviation determines 6.78 metres, a maximum of 2.00metres and maximum of 60 metres of the building height.

Based on this, a regression model to determine the likelihood of change in the was undertaken. The frequency distribution model gave the following graph [Table 3](#).

Table 3

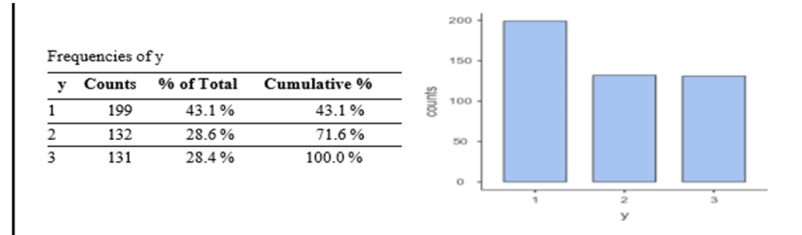


Table 3 Frequency Distribution of the Dependent Variable Y (the Level of Architectural Changes) with the Bar Plot

Observation: Based on the graph and the category wise mean building heights for build categories 1,2 and 3, it is determined that buildings with lesser height less likely to have undergone architectural changes as compared to the buildings with greater height.

A comparative analysis of building height with respect to the approach road was also undertaken to determine the effect of road width on the height of the building. This was done to understand the effect of urbanisation on buildings.

Observation: The graph [Figure 5](#) shows a relationship between road width and building height. It suggests that narrower roads tend to have higher building heights with higher population density, i.e., more people live in these areas. More buildings or closely spaced buildings exist. This is commonly observed in older parts of cities, like areas around temples or historical centers, where roads were originally designed to be narrow. Over time, these areas become more crowded due to urban growth and lack of space. The older "temple roads" are now densely populated and have more tightly packed buildings compared to newer, wider roads. In a gist, older areas are characterized with narrow roads now and have buildings with higher building heights.

Figure 6

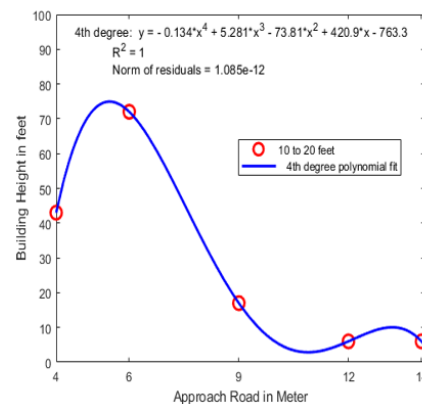


Figure 6 Building Height in Relation to Approach Road

2) Storey

This parameter was selected to identify the quantum of changes in building storey across the surveyed buildings, in order to assess whether the impact of urbanization is directly proportional to the number of storeys. It is important to note that in our ordinal regression model, we did not include the form of categories but actual no. of storeys.

This refers to the number of levels or floors in a building. As seen in [Figure 7](#), [Figure 8](#) and [Figure 9](#), the storeys can be classified into 3 categories. The buildings can be grouped into three types based on the height from the ground to the top of the structure. (1) Ground Floor - it usually means the building has only one level. These are called Ground storeyed buildings. (2) Ground Floor + First Floor - it typically includes two levels. These buildings are slightly taller than single-storey buildings. (3) Ground Floor + 2 or more floors - the building usually has G+2, G+3, etc. This category includes multi-storey and high-rise buildings.

Figure 7



Figure 7 Ground Floor

Figure 8



Figure 8 G+1

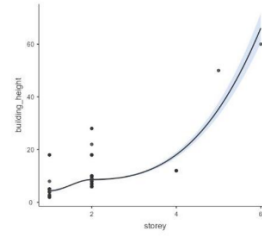
Figure 9



Figure 9 G+2 or more

Table 4

Frequencies of storey			
storey	Counts	% of Total	Cumulative %
1	143	31.4 %	31.4 %
2	296	64.9 %	96.3 %
4	15	3.3 %	99.6 %
5	1	0.2 %	99.8 %
6	1	0.2 %	100.0 %

**Table 4** Frequency Distribution of Storey (X2) Which is a Ratio Variable

Observation: Based on the graph as shown in [Table 4](#), the two independent variable storey and building heights are related and if one increases, the other one also increases.

3) Facade Treatment

This parameter was selected to identify the quantum of changes that have occurred in the façade treatment of the building surveyed so as to understand if the impact of urbanization is directly proportional to the change in the number of built facades of the buildings. In this parameter, the structures are categorized based on the treatment of the facades as indicated in [Figure 10](#), [Figure 11](#) and [Figure 12](#). In this case, (1) Classical represents facades which historically existed during the 19th and 20th century. These typically contained terracotta tiled roof brick walls and generally rose up to the maximum of G+1. (2) Colonial facades represent structures with exposed stone or brick walls with modern slope roofing such as asbestos, CGI sheets, etc. They rose up to a maximum of G+2. (3) Contemporary façade represents modern structures built since the formation of new capital of Bhubaneswar in 1951. Cement, steel, RCC, glass etc., are prime components of this particular façade treatment. [Figure 13](#) represents the façade treatment categorised on the map.

Figure 10**Figure 10** Classical**Figure 11****Figure 11** Colonial

Figure 12



Figure 12 Contemporary

Figure 13

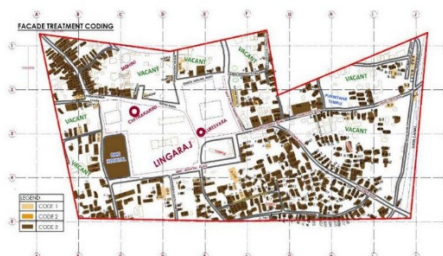


Figure 13 Façade Treatment Colour Coded on Map

Table 5

Facade_Treatment_coded	Counts	% of Total	Cumulative %
1	30	6.5 %	6.5 %
2	2	0.4 %	6.9 %
3	430	93.1 %	100.0 %

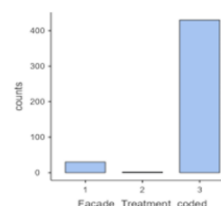


Table 5 Facade Treatment Coded Frequency Distribution and Bar Chart

Observation: As per the modelling shown in Table 5, the category 2 – colonial buildings have only a handful structures which indicate that there has been minimal impact of colonization in this area.

To understand the level of change that have occurred in the studied buildings, a correlation model (Pearson co-efficient and Cramer's V) was studied to determine the distribution of façade treatment over the years and how likely it has changed over the years.

Table 6

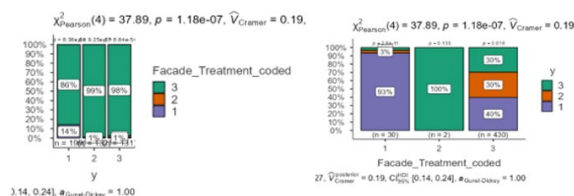


Table 6 Distribution of Facade Treatment According to Y=1,2,3 and Distribution of Y According to Facade Treatment

Observation: This graph above as shown in [Table 6](#), determines that classical facade type (1) is likely to have the least architectural changes and buildings which have contemporary facade (3) is likely to have medium architectural changes, and buildings with colonial facade (2) is likely to have maximum architectural changes.

4) Types of building

The type of building will help in determining the probability of change due to urbanization. In this parameter as shown in [Figure 14](#), [Figure 15](#) and [Figure 16](#), the structures are categorized based on the types of building based on their usage. In this parameter (1) Residential category represents structures which are used typically for residential purpose. This includes both owned and rented houses of all sizes and heights. (2) Commercial category comprises of structures used for shops, public institutions, community centres or any building used for any commercial purpose. (3) Mixed category represents structures which have both commercial and residential usage. This can be a shop cum residence, shopping complex at ground level and residences above etc. The building are categorised on the selected area map as shown in [Figure 17](#).

Figure 14



Figure 14 Residential

Figure 15

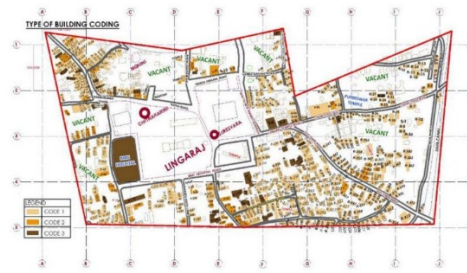


Figure 15 Commercial

Figure 16

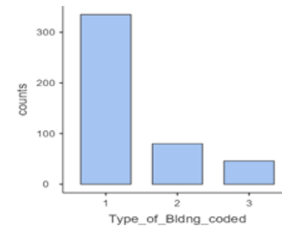


Figure 16 Mixed

Figure 17**Figure 17** Type of Building Colour Coded on Map**Table 7**

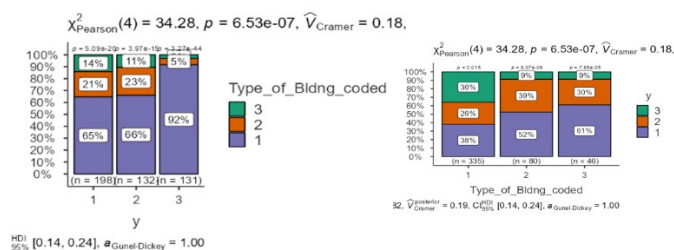
Frequencies of Type of Building coded

Type of Bldng coded	Counts	% of Total	Cumulative %
1	335	72.7 %	72.7 %
2	80	17.4 %	90.0 %
3	46	10.0 %	100.0 %

**Table 7** Type of Building Coded Frequency Distribution and Bar Chart

Observation: As per the model shown in Table 7, category 1, residential buildings are mostly present in the area. However, it is to be noted that many of these residential buildings actually are provided on rental basis to people without notice of authorities.

To understand the level of change that have occurred in the studied buildings, a correlation model (Pearson co-efficient and Cramer's V) was studied to determine the distribution of type of buildings over the years and how likely it has changed over the years.

Table 8**Table 8** Distribution of Building Type According To Y=1,2,3 And Distribution of Y According to Building Types

Observation: Based on the graph as shown in Table 8, it is ascertained that Residential cum shop buildings are likely to have least architectural changes. Buildings which are commercial they are more likely to have more architectural changes. Only residential buildings are the one with maximum architectural changes.

5) Material Used

This parameter was selected to identify the quantum of changes occurred into the materials used of the building surveyed so as to understand the impact of

Urbanization is directly proportional to the changed no. of materials used in the buildings.

The structures are categorized based on the materials used in the buildings as represented in [Figure 18](#), [Figure 19](#) and [Figure 20](#). In this case (1) Temporary represents materials like Polythene and brick exposed, Bamboo framing & sheet, Brick, cement and Asbestos sheet roof, etc. (2) Historic/Traditional; facades represent structures with Brick, cement and tiled roof, Brick, Stone, sand etc. (3) Modern represents Cement plaster, steel, RCC, glass etc. Which are prime components of this particular façade treatment. [Figure 21](#) indicates material used coded on the site map.

Figure 18



Figure 18 Temporary

Figure 19

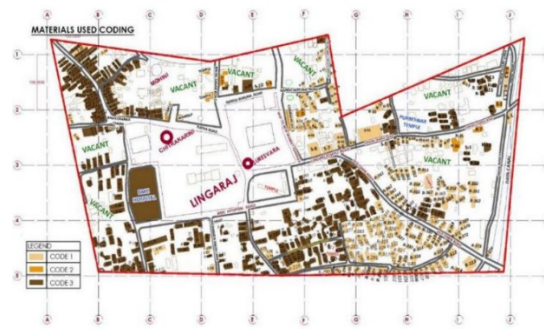


Figure 19 Historic

Figure 20

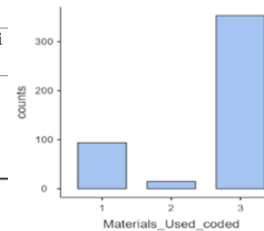


Figure 20 Modern

Figure 21**Figure 21** Material Used Coded on Map**Table 9**

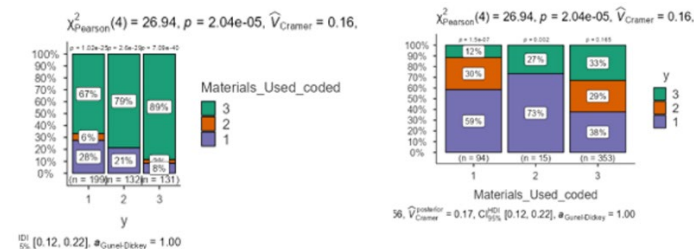
Frequencies of Materials Used coded

Materials Used coded	Counts	% of Total	Cumulative %
1	94	20.3 %	20.3 %
2	15	3.2 %	23.6 %
3	353	76.4 %	100.0 %

**Table 9** Materials Used Coded Frequency Distribution and Bar Chart

Observation: As per Table 9, the historic materials are used in only a handful of structures indicating many have vanished eventually. Most of the buildings have used modern materials and some significant number of temporary structures are also present.

To understand the level of change that have occurred in the studied buildings, a correlation model (Pearson co-efficient and Cramer's V) was studied to determine the Distribution of materials used over the years and how likely it has changed over the years.

Table 10**Table 10** Distribution of Materials Used According To Y=1,2,3 and Distribution of Y According to Materials Used

Observation: The graph shown in Table 10 represents that building with material type 2 which is historic is likely to have least architectural changes. Building with material type 1 which is temporary is likely to have medium architectural changes and building with material type 3 which is modern is likely to have high architectural changes.

6) Technology Used

This parameter was selected to identify the quantum of changes in construction technology across the surveyed buildings, in order to assess whether the impact of urbanization is directly proportional to the shift in building technologies.

This parameter represents the various kinds of technology and techniques used for construction of the identified structures as shown in [Figure 22](#), [Figure 23](#), and [Figure 24](#). The structures are classified into (1) Temporary category represents makeshift arrangements. (2) Load Bearing category represents structures built in traditional load bearing technology which was used before the propagation of RCC and steel structures. This category represents a mix of both historic and contemporary structures. (3) Column/framed technology represents structures built using RCC and steel. This is the modern technology which represents modern era technologies. [Figure 25](#) represents the spread of technology used distributed on a map.

Figure 22



Figure 22 Temporary

Figure 23

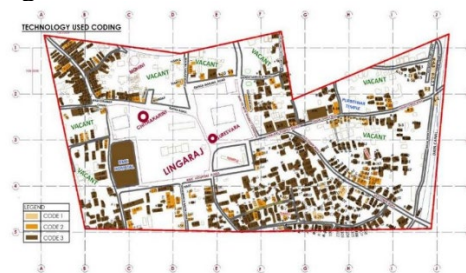


Figure 23 Load bearing

Figure 24

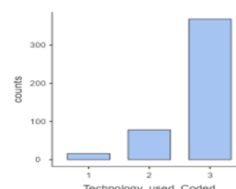


Figure 24 Framed

Figure 25**Figure 25** Technology Used Coded on Map**Table 11**

Frequencies of Technology used Coded

Technology used Coded	Counts	% of Total	Cumulative %
1	16	3.5 %	3.5 %
2	78	16.9 %	20.3 %
3	368	79.7 %	100.0 %

**Table 11** Technology Used Coded Frequency Distribution and Bar Chart

Observation: Based on the model given in Table 11, it is determined that major structures in the survey area have used column and framed structure technology. This is modernist and have undergone major/significant change from the traditional load bearing technology. This indicates that urbanization has severely affected traditional technology with almost 80% structures using column framed structure.

7) Ground Coverage

This parameter will help in understanding the change in building pattern which was relating it to urbanization. It is important to note that although ground coverage is categorized as above for exploratory analysis, while carrying out the ordinal regression we incorporate them as the actual numerical values.

It analyses data of the ground area covered under construction with reference to the plot size. As represented in Figure 26, Figure 27 and Figure 28 (1) 0-20% represents coverage of upto 1/5th of the plot size. (2) 20%-50% represents buildings which covers up to half of the plot size. (3) 50% represents coverage above half of the plot area. The spread of ground cover is represented on a map in Figure 29

Figure 26**Figure 26** 0-20%

Figure 27



Figure 27 20-50%

Figure 28



Figure 28 50% above

Figure 29

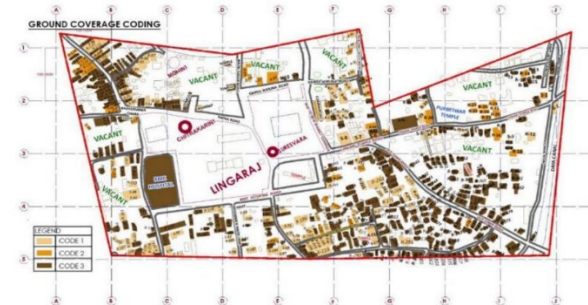
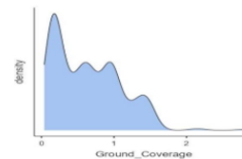


Figure 29 Ground Coverage Coded on Map

Table 12

Ground Coverage	
N	462
Missing	0
Mean	0.637
Median	0.556
Standard Deviation	0.453
Minimum	0.0387
Maximum	2.78



Code.no.	Category	Counts
1	0-20%	142
2	20%-50%	53
3	50% & above	267

Table 12 Frequency Distribution and Density Plot of Ground Coverage (X7) Which is a Ratio Variable

Observation: As per the analysis derived in [Table 12](#), 57% of the houses have larger ground coverage indicating an adverse effect of urbanization. Buildings with less ground coverage have not been majorly affected by urbanization yet and are more likely to change with eventual urban progress.

8) Year of Construction

The construction year parameter will help in determining the factors which guided the construction. As represented in [Figure 30](#), [Figure 31](#) and [Figure 32](#), the classification are (1) Upto 1750 represents structures which were built before any major British intervention in Odisha wherein the traditional architecture was prevalent (2) 1750 -1950 was predominantly the British era and any construction of this period had it's significant influence. (3) 1951 onwards represent the construction post the establishment of a new capital, transforming from temple city to capital city. It is important to note that year of construction is categorized as above for exploratory analysis, but for carrying out the ordinal regression we incorporate them as the actual numerical values of the year. Year of construction is also mapped as shown on [Figure 33](#).

Figure 30



Figure 30 Upto 1750

Figure 31

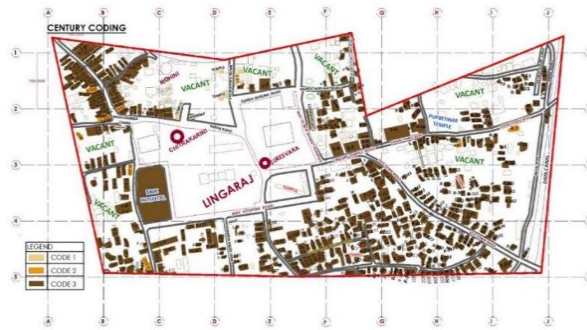


Figure 31 1750 - 1950

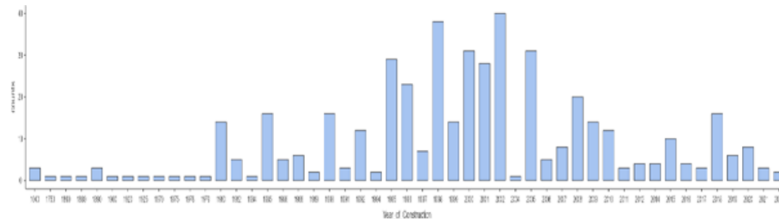
Figure 32



Figure 32 1951 onwards

Figure 33**Figure 33** Year of Construction Coded on Map**Table 13**

Code .no.	Category	Counts
1	Up to 1750	4
2	1750-1950	8
3	1951 onwards	450

**Table 13** Frequency Distribution and Bar Chart of year of Construction (x8) which is a Ratio Variable

Observation: Based on [Table 13](#), major construction have been undertaken since 1950. This is when the temple city transformed into capital city and urbanized rapidly. Only few remains of houses/structures built before 1950's remain.

9) Floor to Floor height

This parameter was selected to identify the changes in building construction styles which have been altered due to urbanization. It is important to note that although floor to floor height is categorized as above for exploratory analysis, while carrying out the ordinal regression we incorporate them as the actual numerical values in metres.

This parameter determines the difference between floors in a building. As shown in [Figure 34](#), [Figure 35](#) and [Figure 36](#) case (1) Up to 3m represents modern houses built after 2000 (2) 3.1-6m represent middle aged structures which used to have greater heights as was the trend of that period of construction. It also represents modern non-residential structures. (3) 6.1 & above represents older structures which had greater Floor to Floor heights - generally used in traditional houses, palatial buildings and temples. [Figure 37](#) represents this categorization on map.

Figure 34



Figure 34 Upto 3 mtr

Figure 35



Figure 35 3.1 to 6 m

Figure 36



Figure 36 6.1 m above

Figure 37

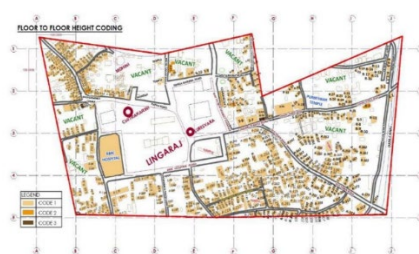
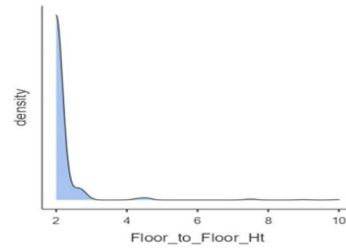


Figure 37 Floor to Floor Height Coding on Map

Table 14

Descriptives	
Floor to Floor Ht	
N	458
Missing	4
Mean	2.13
Median	2.00
Standard deviation	0.684
Minimum	2.00
Maximum	10.0

**Table 14** Frequency Distribution and Frequency Density of Floor to Floor (x9) which is a Ratio Variable**Table 15**

Descriptive			y		Floor to Floor Height
	y	Floor to Floor Height			
N	1	196	Median	1	2.00
	2	132		2	2.00
	3	130		3	2.00
Missing	1	3	Standard deviation	1	0.741
	2	0		2	0.843
	3	1		3	0.299
Mean	1	2.20	Minimum	1	2.00
	2	2.11		2	2.00
	3	2.05		3	2.00
Maximum	1	9.00	Maximum	1	9.00
	2	10.0		2	10.0
	3	4.50		3	4.50

Table 15 Distribution of Floor to Floor Height According to y=1,2,3

Observation: The graph in [Table 14](#) and [Table 15](#) represents if floor to floor height increases then it is less likely to have architectural change and if floor to floor height decreases then it is more likely to have architectural changes. The ordinal regression model that we shall describe later suggests modern building with smaller floor to floor height are less likely to change since they have already been impacted. It is very likely that structures with greater floor to floor height will fall into the effects of urbanization and there will be a change in its character.

10) Plot Size

This parameter was selected to understand the eventual changes of the plot size with the advent of urbanization. As shown in [Figure 38](#), [Figure 39](#) and [Figure 40](#), case (1) 0-100sqm represent plots which have become small eventually due to division of land caused by urbanization. (2) 101-300sqm represents plots from the 20th century (3) 301 sqm & above represents older plots. Group housing plots can also be attributed to this category. In the ordinal regression we incorporate plot size as the actual numerical values, and not as categories. [Figure 41](#) shows the classification on the site map.

Figure 38**Figure 38** 0-100 sqm

Figure 39



Figure 39 101-300 sqm

Figure 40



Figure 40 300 sqm above

Figure 41

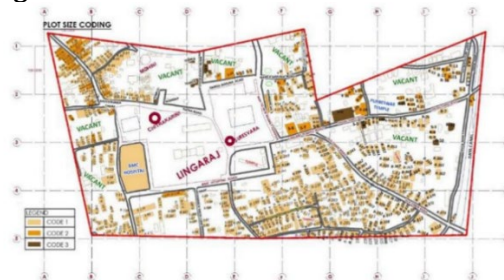
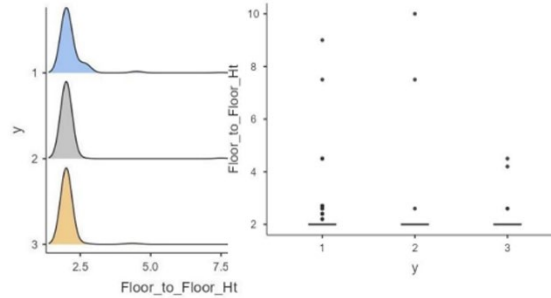
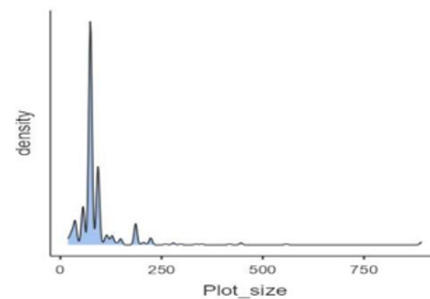


Figure 41 Plot Size Coded on Map

Table 16**Table 16** Density Plots and Box-Plots for Floor-to-Floor Height of Buildings Falling in Category y=1, y=2 and y=3**Table 17**

Descriptives

	Plot_size
N	462
Missing	0
Mean	95.2
Median	74.0
Standard deviation	86.1
Minimum	19
Maximum	892

**Table 17** Frequency Distribution and Frequency Density of plot Size (x10) which is a Ratio Variable

Observation: From [Table 16](#) and [Table 17](#), it can be analysed that majority of the plots have eventually been divided into fragments. This is an outcome of rapid urbanization changing the original larger plots which would have been the original character of Ekamrakshttra. The bigger plots are highly likely to get further change or divided into smaller plots due to rapid urbanization.

11) Aspect Ratio

This parameter was selected to identify the quantum of changes in the aspect ratio of the surveyed buildings, in order to understand whether the impact of urbanization is directly proportional to the number of altered aspect ratios. In the ordinal regression we incorporate aspect ratio as the actual numerical value, and not as categories.

This parameter was selected to study the depth of the plot sizes with respect to it's frontage. As shown in [Figure 42](#), [Figure 43](#) and [Figure 44](#), case (1) Above 1- represents plots which are older and thus have front width. (2) 0.5- 1- This represents plots which have undergone limited partitions. (3) less than 0.5- It represents plots which have been affected by urbanization & population growth. [Figure 45](#) represents the aspect ratio earmarked on map.

Figure 42



Figure 42 Above 1

Figure 43



Figure 43 0.5 - 1

Figure 44



Figure 44 less than 0.5

Figure 45

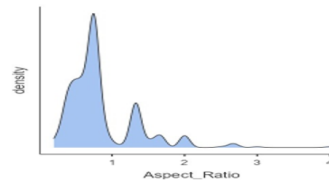


Figure 45 Aspect Ratio Coding on Map

Table 18

Descriptives

	Aspect Ratio
N	462
Missing	0
Mean	0.851
Median	0.750
Standard deviation	0.483
Minimum	0.200
Maximum	4.00

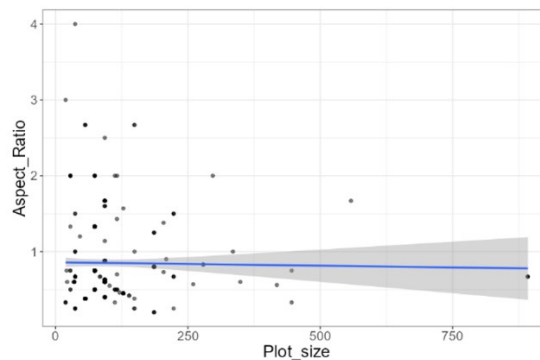


Code. no.	Category	Counts
1	Above 1	110
2	0.5 - 1	282
3	Less than 0.5	70

Table 18 Frequency Distribution and Frequency Density of Aspect-Ratio (X11) Which Is a Ratio Variable

Observation: Table 18 suggests that aspect ratio of the plots have significantly changed from wider frontage to narrower frontage. This suggests division of plots in perpendicular to the access roads due to urbanization. There has been a noteworthy change in the original aspect ratio where the frontage of the plots would have been greater than the depth.

A linear regression as shown in Table 19, in correlation with plot size was undertaken to determine any relationship of aspect ratio with plot size. The details of the findings are as below.

Table 19**Table 19** Linear Regression of Aspect Ratio on Plot Size

Observation: Table 19 suggests that there is no significant relation between plot size and aspect ratio as the correlation is weak. Thus, irrespective of the plot size, there has been a change in the aspect ratio. Ideally, the plot size and the aspect ratio should be inter-related in-case of a planned growth. This indicates there has been very little consideration of setbacks and offsets while the new buildings have been constructed. This shows a severe impact of urbanization.

12) Other Correlation models

Similar to the aspect ratio and plot size, there were other correlations which were also explored to analyse the inter-relationships between the parameters to determine the analyse and determine the effect of urbanization on the temple town of Ekamra Kshetra. Detailed analysis is outlined in the following matters.

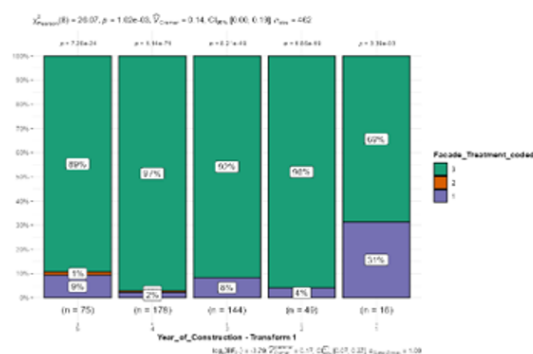
Façade treatment with the year of construction

To understand the change in the façade over the centuries or specifically the façade treatment before and after the creation of the capital city, there was a correlation model created to analyse the change.

To determine this, the year of construction was categorized into 5 categories 1040-1979 1; 1980-1989 2; 1990-1999 3; 2000-2009 4; 2009-2022 5

As shown in Table 20, we checked how the facade treatment type changes along the different year of construction categories 1,2,3,4 and 5.

Table 20



Contingency Tables

Façade_Treatment_coded	Year_of_Construction - Transform 1					Total
	5	4	3	2	1	
1	7	4	12	2	5	30
2	1	1	0	0	0	2
3	67	173	132	47	11	430
Total	75	178	144	49	16	462

Table 20 Correlation of façade Treatment with year of Construction

Observation: As evident from the Table 20 contingency tables, façade treatment has been directly affected by the year of construction. There is a significant change to the category 1 façade – classical façade (31%). This trend developed majorly since the 1980s when industrial growth commenced in Odisha and Bhubaneswar gained attention with opening of offices in Odisha.

5. KEY FINDINGS FROM THE MODEL ANALYSIS

Table 21

Table 21 Summary of variables

Variable	Symbol	Description	Unit/scale of measurement	Highest level of change (%)
Dependent Variable - Change in built heritage	Y	The likelihood of modification made in each	Measurement converted into ordinal values	

building surveyed				
<i>Building height</i>	X1	Height of the building surveyed	Upto 3 metres, 3.1 to 6metres, 6.1 and above	43.10%
<i>Storeys</i>	X2	The number of storeyes of each building	Ground, G+1, G+2 or more.	64.90%
<i>Façade treatment</i>	X3	Description of the nature of façade treatment	Classic, colonial, contemporary.	93.10%
<i>Type of building</i>	X4	The nature of the use of the building	Residential, Commercial, Mixed.	72.70%
<i>Material Used</i>	X5	Variety of material used	Temporary, historic, modern.	76.40%
<i>Technology Used</i>	X6	Technology used for construction of the building	Temporary, load bearing, framed.	79.70%
<i>Ground Coverage</i>	X7	Coverage of ground by the building in respect to the plot size	Percentage.	57.70%
<i>Year of Construction</i>	X8	Depicts the tentative year of construction of the building	Upto 1750, 1750 -1950, 1951 onwards.	97.40%
<i>Floor to floor height</i>	X9	Depicts the height of each floor.	Upto 3 metres, 3.1 to 6metres, 6.1 and above.	42.40%
<i>Plot Size</i>	X10	Describes the area of each plot	Upto 100 sqm, 101 -300 sqm, 301 sqm and above.	28.60%
<i>Aspect Ratio</i>	X11	The proportion of width of the plot to the depth of the plot	Above 1, 0.5 to 1, less than 0.5.	50.75%

Based on the derivatives of [Table 21](#), the analyses undertaken for the determination of change in the selected eleven parameters have highlighted the following key findings:

- 1) Façade treatment have been the major change as a result of urbanization. The facades have changed drastically to contemporary as against the classical style. The facades have either been largely altered or the old buildings have been demolished to give way for newer construction with modern facades to accommodate family division and number of members. This can also be related to the year of construction which depicts a significant increase due to urbanization in later years, majorly after the 1980s. The building height has increased with the growth of population and increase in the family size.
- 2) The technology used for construction of structures have eventually changed over the centuries. Local bricks, stones, clay tiles have eventually been replaced with modern materials such as cement blocks, RCC and steel. This has majorly affected the holistic appearance of the structures along the access road making the spatial appearance clumsy and confusing. The visual sanctity of the space is lost to a great extent.
- 3) The buildings would have historically developed as residences, some shops and also some rest shelters for the pilgrims – dharamshalas. These would have been built with wide frontage as compared to the depth for visibility with ample setbacks to allow proper lighting and ventilation which suits best for the climatic conditions of the space. However, with the advent of urbanization and population splurge, the nature of use of the structures have been largely altered. Many of these structures, as evident have been either demolished or renovated with modern interventions changing the profile of the buildings. Shops and residences have been developed together in a building. Generally the shops are in the ground floor and the residences are made on the upper floors. These upper floor residences too have been commercialised either for rental purposes or for tourist residences. Greed of the owners to get maximum have changed the use of the buildings with no setbacks, making it often uncomfortable for living.
- 4) The road width have no relation to the height of the buildings. Clearly there is either violation of building bye-laws or un-precedented approvals have been acquired through unfair means for vertical growth of the buildings.
- 5) Most of the buildings surveyed are residential buildings. This indicates the strong connection between the temple and the settlements nearby which still exists. However, this is also a visible change being observed with increase in mixed use buildings which is a part of sustainability for the local residents who are not associated with any other profession.
- 6) Use of materials for construction has eventually changed from historic to modern. Bricks, stones are being replaced with cement blocks, steel and glass. This poses a serious threat to the micro-climate of the space making it hotter and compelling use of artificial ventilation methods which further deteriorate the climate.
- 7) Traditional building technology have given way to modern construction techniques erasing the traditional features and thus affecting the façade of the building.
- 8) Most of the structures are built in the plot with little respect of the plot size and there is no consideration of aspect ratio, i.e., the width of the building to the depth of the building. As evident in one of the 18th century structures,

these would have been otherwise. The gradual change is due to increase in population in the area and lack of any guideline for protection of the historic fabric.

6. CONCLUSION

This research has been successful to understand and evaluate the impact of the present urbanization happening on the morphological characteristics in the temple towns of Odisha. This research has enhanced the understanding of the evolution pattern of the historic towns of Odisha, assessed and analysed the impact of present urbanizations happening in the temple towns. It has successfully traced the historic growth patterns of temple towns in Odisha, offering insights into their traditional urban forms. Additionally, it has critically assessed the present-day urbanization trends and their tangible and intangible impacts on the urban morphology, thereby fulfilling the core aim of the study. The analyses undertaken for the study of the impact of urbanization on Ekamra Kshetra, Bhubaneswar, Odisha – a 12th-century urban settlement has been very vast and meticulous. Analysis of each of the parameter has ascertained the level of damage on the original fabric of the locality. Several other parameters such as change in occupancy, Land value, change in movement of circulation, etc also could have been undertaken. All of these would have required further detailed investigation and critical observation at site, demanding significant time, which was not possible currently. These research can be undertaken at a later stage and may form a larger study analysis of the given area to complete a holistic study of the effects of urbanization in Ekamra Kshetra. A pilot project may be established to assess an effective and practical solution for the key issues identified. It will also be helpful to determine the steps required to ensure either reversal of the damage or restrict the damage to its current state. Based on these findings, there is need for development of adequate guidelines which are holistic in nature and also offer sustainable solutions to the current problems. The guidelines thus developed shall also have effectively implemented on the ground rather than a hogwash as has been the cases in many of the cities in India. Greater co-ordination amongst all the urban development authorities is needed to ascertain a model conservation and urban renewal of this area, for this study and analysis can form the basis.

CONFLICT OF INTERESTS

None.

ACKNOWLEDGMENTS

None.

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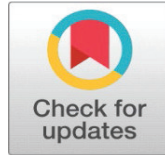
EKAMRA KSHETRA AND THE TEMPLE TOWN TRADITION OF ODISHA: A HISTORICAL AND CULTURAL STUDY

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ABSTRACT

The evolution of temple towns in Odisha, particularly focusing on Ekamra Kshetra, highlights the intricate relationship between urbanization and cultural heritage. Temples serve as sacred spaces, with their architectural styles reflecting the region's historical and spiritual significance. The study traces the development of Bhubaneswar, known as the 'City of Temples,' from its ancient roots to its modern urban landscape, emphasizing the impact of urban growth on its historic character. The research identifies the challenges posed by rapid urbanization, including the erosion of traditional identities and the need for sustainable urban planning. By examining the architectural and cultural transformations within Ekamra Kshetra, the study underscores the importance of preserving Odisha's rich temple heritage amidst contemporary development pressures.

Keywords: Ekamra Kshetra, Temple, Odisha, Historical and Cultural

1. INTRODUCTION

Temple towns are generally developed in a manner that aligns with spiritual aspirations and functional planning based on rituals. In India, historically, many cities have evolved from the religious core and continue to serve as urban areas with religious activities as prime activity. Currently, there is no suitable definition of "temple town" in existing literature. For this research study, a temple town is defined as an urban area that has evolved around one or more temples or temple-related beliefs and continues to attract significant tourist traffic. It is important to

note that some cities have their core temples but do not currently have a prominent deity for worship or religious pilgrimage. Additionally, there are cities that have lost their significance as sacred centers and are developing primarily as administrative capitals rather than as destinations for spiritual pilgrimage [Rajakumari et al. \(2019\)](#). This is still evident in city like Bhubaneswar. Conversely, the Lingaraja Temple, Rajarani Temple in Ekamra Khestra, and Jagannath Temple in Puri continue to thrive as sacred tourist destinations.

Urbanization is occurring rapidly in the historic cores of Odisha's old cities, largely due to the absence of strict planning regulations and urban design guidelines. Recent modern developments in these areas are significantly impacting their original character. As a result, the unique identity of these places is gradually disappearing. This research aims to explore the effects of urbanization on these temple towns, reveal the changes in the built environment, and assess the need for improved physical and socio-cultural infrastructure in these heritage zones.

2. BACKGROUND

The state of Odisha, formerly known as Orissa, is situated on India's eastern coast and is bordered to the east by the Bay of Bengal. Ancient temples, colorful festivals, traditional arts, and a wide variety of fauna may all be found there. It is renowned for its rich cultural legacy, history, and scenic beauty. Odisha's traditional villages have been profoundly impacted by rapid urbanization, which has brought with it both opportunities and challenges. Modern infrastructure is invading historic sites due to urban expansion, endangering their structural integrity and cultural relevance. Land use changes, transportation congestion, and population growth all put strain on historic regions in cities like Puri, Cuttack, and Bhubaneswar. Traditional ways of life are frequently lost as a result of this progress, and intangible cultural heritage is eroded. But, if well managed, urbanization can also have positive effects for conservation efforts, such as better infrastructure and more economic opportunities. To ensure that modernity does not come at the expense of cultural heritage, a balanced strategy integrating sustainable urban design and active community involvement is necessary for the effective preservation of Odisha's historic settlements. The famous historic towns of Odisha was 1)Viraja nagari – Jajpur 2) Ekamra prastha – Bhubaneswar, 3) Sri Purushottam Puri – Puri, 4) Konakama – Konark, 5) Kosala – Sambalpur, 6) Kongoda – Ganjam, 7) Utkala – Cuttack. [Mishra \(1989\)](#)

Figure 1



Figure 1 Map to Show the Historic Settlements in Odisha

Source Authors

3. STUDY AREA

The state capital of Odisha, Bhubaneswar, has been an important center of religion and culture for more than two millennia. Known as the "City of Temples," Bhubaneswar was formerly a part of the Kalinga monarchy. Many temples dot the city's landscape, the most prominent of which is the 11th-century Lingaraja Temple, a masterwork of Kalinga architecture. The historical significance of the city as a hub for Hindu worship and innovative architecture is reflected in these temples. [Garnayak \(2007\)](#)

Figure 2



Figure 2 Odisha and Bhubaneswar

The legendary Kalinga War occurred in the region during Ashoka's rule in the third century BCE. Following this event, Ashoka adopted Buddhism, which had a

profound impact on the religious and cultural fabric of the area. Known as the "Temple City of India," Bhubaneswar is a significant religious center that is well-known for its historic temples and rich cultural legacy. The city is home to more than 700 temples, the most well-known of which is the Lingaraj Temple, which honors Lord Shiva and features Kalinga architecture. Other important religious locations are the Rajarani Temple, the Mukteshwar Temple, and the Ananta Vasudeva Temple. The temples of Bhubaneswar draw both tourists and believers because they provide a spiritual and architectural window into the past. The city is a major hub for religious events and pilgrimages because of its unique combination of spirituality, history, and culture. As a religious hub, Bhubaneswar kept growing, drawing tourists and academics from various parts of India.

When the city was selected in 1948 to serve as the capital of the newly created state of Odisha, it experienced a dramatic metamorphosis in the middle of the 20th century. The new capital was to be designed by German architect Otto Königsberger, who created a contemporary urban layout with wide streets, green areas, and administrative buildings. With this construction, Bhubaneswar officially changed from being a medieval temple town to an urban planning hub.

Bhubaneswar has seen a rapid increase in modernization and urbanization in recent years. With the presence of numerous esteemed establishments like the All-India Institute of Medical Sciences (AIIMS) and the Indian Institute of Technology (IIT), it has become a significant center for both education and the economy. The IT industry in the city has expanded, drawing capital and creating job possibilities. Bhubaneswar has made progress in the development of its infrastructure, including new commercial spaces, contemporary residential complexes, and better transportation networks, in tandem with its economic expansion.

Even with these developments, Bhubaneswar has been able to maintain its cultural legacy. The city's distinct fusion of heritage and advancement is highlighted by the presence of historic temples and contemporary facilities. Bhubaneswar is regarded as one of India's smart cities today, successfully juggling modern urban development with the preservation of its rich cultural history. The city is still thriving today.

Figure 3

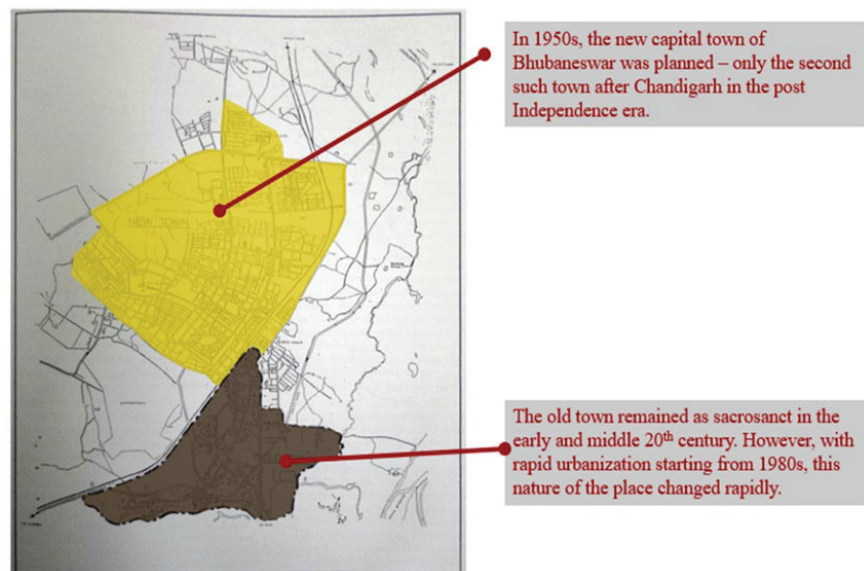


Figure 3 Map of the City of Bhubaneswar -old and new town; Source: EKAMRA KSHETRA

4. BHUBANESWAR – HISTORIC GROUP SETTLEMENTS

Famous for its ancient group settlements, Bhubaneswar has a rich and varied cultural legacy in places like Dhauli, Khandagiri, Ekamra Kshetra, and Sisupalgarh. Every one of these locations provides a distinct window into the rich past and magnificent architecture of Odisha. Khandagiri: Famous for its rock-cut caves that date back to the first century BCE, Khandagiri is also known for the nearby Udayagiri hills. King Kharavela of the Mahameghavahana dynasty ordered the construction of these caverns for Jain monks. The stunning sculptures and inscriptions in the meticulously carved caves, like the well-known Rani Gumpa (Queen's Cave), offer insights into the Jain religion and the sociopolitical context of the time. The area's rich spiritual and cultural history is attested to by the caverns.

Figure 4

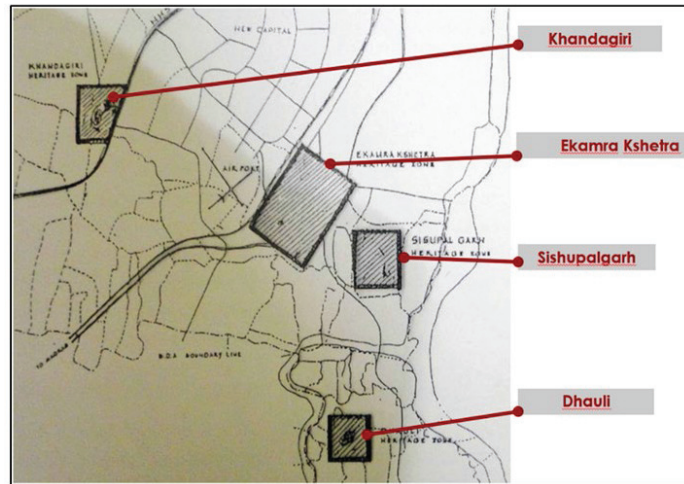


Figure 4 Map Showing the Ancient Group Settlements in Bhubaneswar

Source

https://www.researchgate.net/publication/325904510_The_Chitrakarini_Temple_of_Bhubaneswar_Odisha_India_An_Investigative_Field_Study

- 1) **Ekamra Kshetra:** Known for its concentration of historic temples, Ekamra Kshetra, the old town of Bhubaneswar, has been dubbed the "City of Temples." The exquisite 11th-century Lingaraja Temple, devoted to Lord Shiva, is located in this region. The temple complex, with its soaring spire, elaborate carvings, and expansive courtyard, is a prime example of Kalinga architecture. Other noteworthy temples in Ekamra Kshetra include the Rajarani Temple, distinguished by its red and yellow sandstone structure, and the Mukteswara Temple, renowned for its elaborate carvings and elaborate archway. Because of its historical significance, this region is a hub for religious and cultural events, honoring the city's long history. [Mishra \(1989\)](#)
- 2) **Sisupalgarh:** One of India's biggest and best-preserved ancient fortifications, Sisupalgarh is an old fortified city that dates back to the third century BCE. A sophisticated urban colony with thoughtfully designed streets, imposing entrances, and cutting-edge drainage systems is revealed by archaeological investigations. The city's rectangular layout and fortified walls were purposefully created to highlight the engineering

prowess and urban planning abilities of its residents. Sisupalgarh provides an enlightening glimpse into Odisha's pre-urban history and its importance as a significant political and cultural hub.

- 3) **Dhauili:** Situated on the banks of the Daya River, Dhauili is a location with significant religious and historical significance. It is most known for being connected to the Kalinga War (261 BCE), which turned Emperor Ashoka from a conqueror to a Buddhist supporter. The Shanti Stupa (Peace Pagoda), built in the 1970s by the Japan Buddha Sangha and the Kalinga Nippon Buddha Sangha, is a distinguishing feature of the Dhauili hills. Reflecting Ashoka's adoption of Buddhism, the rock edicts of Ashoka, written on a rock next to the stupa, promote the values of dharma (righteousness) and non-violence. Dhauili is still a popular destination for pilgrims and a representation of harmony and tranquility.

5. EKAMRA KHESTRA-THE HISTORICAL CONTEXT

The history of Bhubaneswar begins with the conquest of Kalinga by Ashoka in 261 B.C. Before the 3rd century B.C., the history of Bhubaneswar is not well-documented. However, archaeological findings from the Neolithic, chalcolithic, and early historical periods indicate that humans inhabited this area as early as 2000 B.C. Discoveries of ring stones, microliths, and black-and-red pottery support this assertion. The excavation of Sishupalgarh conducted in 1948 provided significant insights into its chronological framework, indicating a timeline that extends from 300 B.C. to 350 A.D. However, a recent re-evaluation of specific pottery types discovered during these excavations, along with a comparative analysis of similar pottery found in South India, suggests the possibility of revising the earlier date for Sishupalgarh beyond the previously established 300 B.C. The particular type of pottery under consideration is known as black and red ware.

Little is known regarding the ruler of ancient Kalinga during the period of the Asokan conquest. However, it is established that Sishupalgarh served as the ancient capital of the Kalinga dynasty at that time. Following the liberation from Magadhan domination, the Chedi dynasty emerged as the next significant ruling power in ancient Orissa. Kharavela, recognized as the most prominent monarch of the Chedi dynasty, presided over a brief yet impactful reign lasting 13 years, as documented in his Hatigumpha inscription located at the Udayagiri caves near Bhubaneswar. Sishupalgarh, along with the nearby historic site of Old Bhubaneswar, likely constituted the primary capital region during the reign of the Chedi dynasty. It is challenging to find evidence regarding rulers following the 1st century B.C. until the emergence of the Sailodbhavas. However, through archaeological findings, it is possible to reconstruct the history of Bhubaneswar during this period. Based on the discovery of sculptures, pottery, coins, and other artifacts, it can be reasonably inferred that post the 1st century B.C., Bhubaneswar was influenced by external powers such as the Kushanas, the Murundas, and the Guptas, in addition to the local *vigraha* rulers of Toshali.

The golden era of cultural history in this region spans from the late 6th century A.D. to A.D. 1568. During this period, Bhubaneswar was administered by several prominent dynasties, including the Sailodbhavas (A.D. 575 – A.D. 700), the Bhaumakaras (A.D. 736 – A.D. 940), the Suryavamsis (A.D. 1435 – A.D. 1540), and the Chalukyas (A.D. 1559 – A.D. 1568). Subsequently, Orissa lost its independence as administrative control of the coastal district transitioned to the Mughals, the Sultans of Bengal, the Marathas, and ultimately the British, which continued until 1947. In conclusion, it can be observed that although *Ekamra Khestra* Bhubaneswar

diminished in its significance as the capital city after the 1st Century B.C., it subsequently achieved recognition as a prominent Saiva center, evolving into a city renowned for its numerous temples. This transformation established it as a significant pilgrimage destination, a status it continues to uphold in the present day. Concurrently, the establishment of New Bhubaneswar has resulted in its designation as the new capital of the modern state of Odisha.

Figure 5



Figure 5 Lingaraja Temple lithograph by James Fergusson and Thomas Dibdin, in 1847| Columbia University

Source <https://puratattva.in/lingaraja-temple-climax-of-the-kalinga-architecture/>

Ekamra Kshetra encompasses the historical area of the old city of Bhubaneswar, which serves as the focal point for temple architecture. This region is recognized as a significant Hindu pilgrimage site. As per the Anantavasudeva Inscription of Paramarddi, *Ekamra* was a sacred area "...adorned with hundreds of mango-groves, wherein exists a single Devakula [temple] surrounded by numerous temples." The 13th-century *Ekamra Purana* describes a sacred area known as *Ekamra Kshetra*, which spans a circumference of 10 miles, bordered by prominent landmarks such as Khandagiri Hills, Kundalesvara Temple, Balhadevi Temple, and Bahirangesvara Temple, with the Lingaraj Temple positioned at its center. This sacred *Kshetra* also encompasses an inner circle defined by the Meghesvara Temple and Sundaresvara Temple. The *Ekamra Kshetra* comprises 45 villages organized into eight sacred precincts, each featuring water bodies, temples, shrines, tirthas, and ritual procession routes linked to the Lingaraj Temple. While Lingaraj Temple served as the focal point of *Ekamra Kshetra*, the historical town of Bhubaneswar oriented towards the Bindusagar Tank situated in close proximity to the temple. A geomantic approach was implemented in the town's planning, carefully considering topography, the location and orientation of water bodies, land use zoning, and other factors. The overall structure of the town reflects an organic adaptation of the Mandala concept rather than a strict geometric design. Tanks such as Bindusagar, Devipadahara Tank, and Kapilesvara Tank are imbued with religious significance and are regarded as sacred sites.

Ekamra Kshetra, known as the "Temple City," is remarkable for its concentration of ancient monuments, featuring around 700 temples that showcase

the evolution of Kalinga architecture, culminating in the renowned Lingaraj Temple. Architectural historian James Fergusson praised it as "one of the finest examples of a purely Hindu temple in India." The site also exemplifies meticulous urban planning, integrating water bodies and a structured road system based on the Mandala concept. *Ekamra Kshetra* highlights a blend of religious traditions, including Brahminical, Buddhist, and Jain systems, with Brahminical faiths like Saiva, Sakta, and Vaisnava demonstrating advancements in architecture and urban planning. The temples serve as vital centers for cultural traditions, rituals, and festivals, aided by the longstanding Sevayats (Servitors) and their communities surrounding the temples.

Figure 6



Figure 6 Lingaraja Temple by Martin Hurlimann in 1928| Columbia University

Source <https://puratattva.in/lingaraja-temple-climax-of-the-kalinga-architecture/>

6. EKAMRA KHESTRA-THE HISTORICAL CONTEXT

Bhubaneswar, a city renowned for its rich history and architectural wonders, has undergone several phases of development, each distinguished by unique group settlements that over the ages have reflected the cultural, religious, and political significance of the city. These communities' development can be linked to numerous significant historical periods:

1) Ancient Period (3rd Century BCE - 1st Century CE)

Sisupalgarh: Dating back to the third century BCE, Sisupalgarh is one of the oldest known urban settlements in Bhubaneswar. This fortified city, with its rectangular form, imposing entrances, and intricate drainage systems, is a prime example of superior urban design. During the Mahameghavahana dynasty's tenure, archaeological digs have shown a prosperous metropolis that functioned as a significant political and cultural center.

2) Early Historic Period (1st Century BCE - 3rd Century CE)

Khandagiri and Udayagiri caverns: In the first century BCE, King Kharavela ordered the construction of these rock-cut caverns for Jain monks. The elaborate carvings and inscriptions on the cave walls offer important insights into the

religious and cultural customs of the era. The intricate sculptures and architectural aspects of the Rani Gumpha, also known as Queen's Cave, are especially noteworthy.

3) Medieval Period (7th Century CE - 12th Century CE)

Ekamra Kshetra: Bhubaneswar, and especially the Ekamra Kshetra region, became an important religious centre in the Middle Ages. Many temples were built during this time, the most well-known of which is the 11th-century Lingaraja Temple. The temple complex is a prime example of the Kalinga architectural style, which is distinguished by tall spires, fine sculptures, and complex rites. Other noteworthy temples from this era are the Rajarani Temple, which is distinguished by its distinctive sandstone structure, and the Mukteswara Temple, which is well-known for its elaborate arches.

Figure 7



Figure 7 Asta Ayatana Plan

Name of Ayatana	Important Monuments
1 st Ayatana	Ananta Vasudeva, Lingaraj, Sahasralinga Tank
2 nd Ayatana	Papanasini Kunda, Yameswara, Venu – Kichaka
3 rd Ayatana	Ganga Yamuna Kunda, Mukhteswara
4 th Ayatana	Rajarani, Kedareswara, Gouri Kunda
5 th Ayatana	Brahma Kunda, Brahmeswara
6 th Ayatana	Megheswara, Kapalamochaneswara
7 th Ayatana	Uttareshwara, Bhimeswara
8 th Ayatana	Rama Kunda, Lakshmaneswara

7. ANALYSIS, DISCUSSIONS AND FINDINGS

Ekamra Kshetra – Development of Astayatan

1) The Ekamra Kshetra Chronology

The history of the Ekamra Kshetra neighborhood of Bhubaneswar is extensive, spanning multiple centuries. This area, which is well-known for having a high concentration of temples, displays how Odisha's architecture and culture have

changed throughout time. This is a summary of Ekamra Kshetra in chronological order:

Figure 8

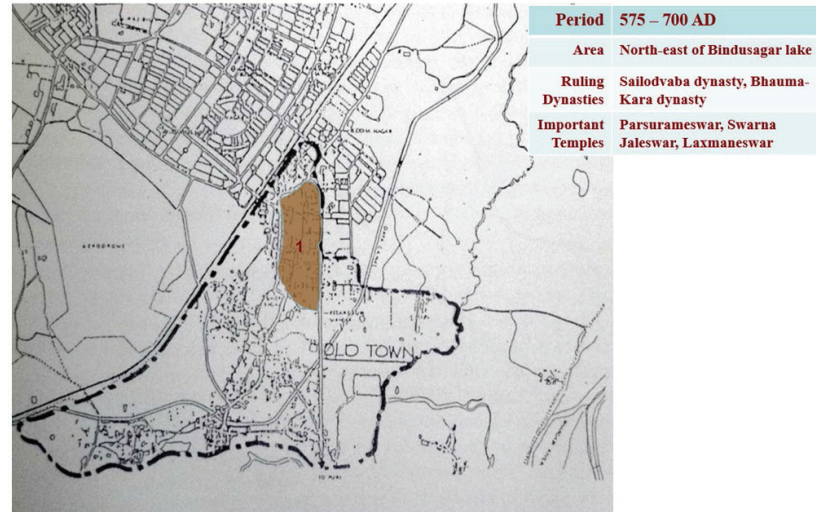


Figure 8 Ekamra Kshetra Stage 1

2) Early Historic Period (6th Century CE - 8th Century CE)

- Important Temple Constructions: In the seventh and eighth centuries CE, the Mukteswara Temple, which is regarded as a masterpiece of Odishan architecture, was built. The development of the mature Kalinga architectural style can be seen in this temple, which features an outstanding torana (arched entryway) and intricate sculptures.

Figure 9

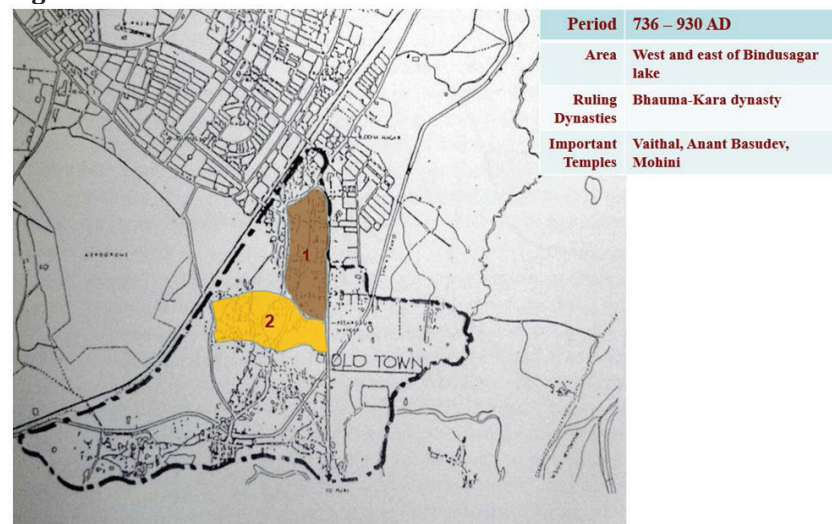


Figure 9 Ekamra Kshetra Stage 2

3) Medieval Period (8th Century CE - 12th Century CE)

- 9th–10th century CE: Several minor temples are constructed, including the Parsurameswar Temple, which demonstrates the intricate details of temple building and sculpture as they evolve.

- 11th century CE: Work on the Lingaraja Temple begins. This is the biggest and most well-known temple in Ekamra Kshetra. This temple, which honors Lord Shiva, becomes a hub for devotion and pilgrimage and represents the pinnacle of Kalinga architecture.
- The Rajarani Temple was constructed in the twelfth century CE. It is distinct from the other temples in Bhubaneswar due to its intricate figurative carvings and unusual red and yellow sandstone.

Figure 10

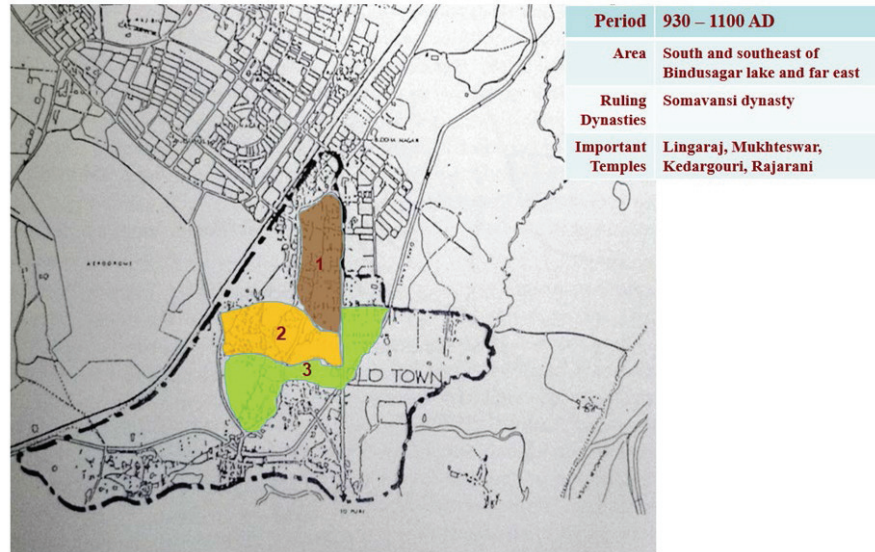


Figure 10 Ekamra Kshetra Stage 3

Figure 11

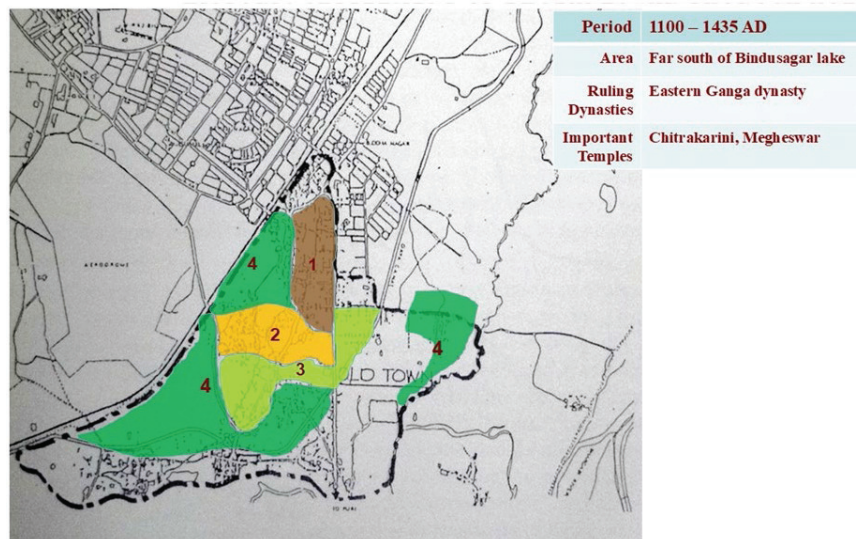


Figure 11 Ekamra Kshetra Stage 4

4) Post-Medieval Period (12th Century CE - 16th Century CE)

Remaining Religious Significance: Ekamra Kshetra is still very important religiously, even though the number of new temples being built is decreasing. The temples are still used as active places of worship, and the region is where older buildings are maintained and occasionally renovated.

- Cultural Renaissance: With rituals, festivals, and customs being actively kept and upheld, the temples of Ekamra Kshetra are essential to Odisha's cultural renaissance.

Figure 12

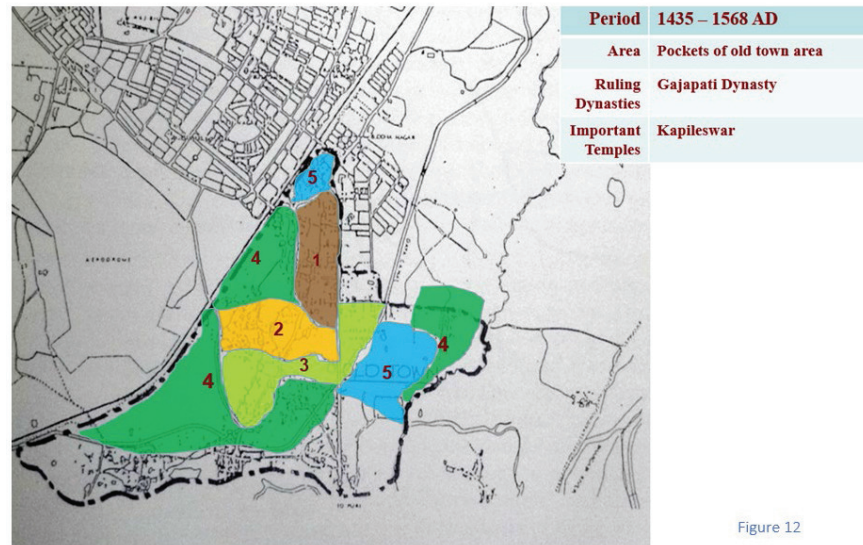


Figure 12

Figure 12 Ekamra Kshetra Stage 5

5) Colonial Period (19th Century CE - Mid-20th Century CE)

- British Administration: There is very little direct action in Bhubaneswar, including Ekamra Kshetra, during British control. Local communities still acknowledge and protect the area's religious and cultural legacy, nevertheless.
- Archaeological Interest: Historians and archaeologists are drawn to the temples, which prompts research and documentation that serves to conserve and advance knowledge of Odisha's architectural legacy.

6) Modern Period (Post-Independence 1947 - Present)

- 1948: The newly constituted state of Odisha names Bhubaneswar as its capital. Planned urban development is implemented in the area, fusing contemporary infrastructure with its ancient landmarks.
- Conservation Initiatives: With a greater emphasis on conserving Ekamra Kshetra's historical legacy, conservation initiatives are being undertaken to preserve the temples' structural integrity and cultural relevance.
- Travel and Pilgrimage: Ekamra Kshetra is becoming a popular travel and pilgrimage site. In order to maintain the viability of the historic temples and their customs in the face of contemporary development, the state government and local authorities market the region as a heritage site.
- The Smart City effort, which includes Bhubaneswar, includes goals to improve urban living while honoring and protecting its historical zones, such as Ekamra Kshetra.

Figure 13

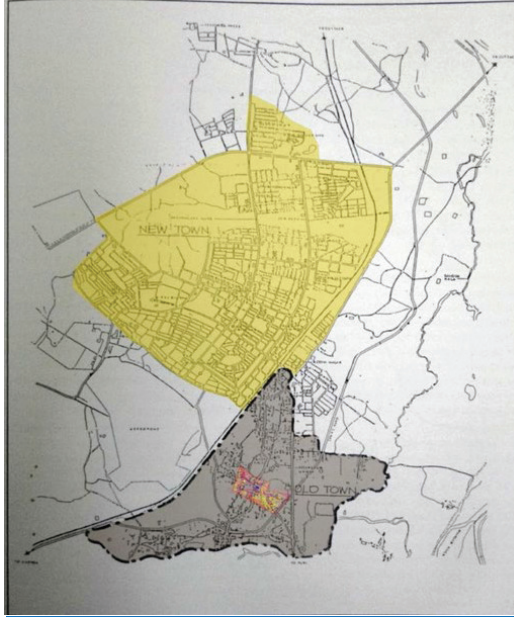


Figure 13 Ekamra Kshetra, Source: Ekamra Heritage report

8. DEVELOPMENT OF THE NEW CAPITAL TOWN OF BHUBANESWAR

An important period in the history of Odisha and post-independence urban planning in India was marked by the growth of the new town of Bhubaneswar in the middle of the 20th century. The necessity to replace the older, more crowded town of Cuttack with a new capital for the state of Odisha was the driving force behind this transition.

9. INITIAL STRATEGY AND VISION

1948: Following Indian independence, Odisha needed a new capital large enough to handle contemporary administrative tasks and allow for further expansion. The historical significance, strategic position, and potential for growth of Bhubaneswar led to its selection.

Otto Königsberger's Master Plan: The new town was to be designed by German urban planner and architect Otto Königsberger. His idea of a contemporary, well-functioning metropolis with an orderly urban structure was paramount. Wide streets, lots of greenery, and separate areas for business, residential, administrative, and recreational use were all included in the concept. The goal of Königsberger's design was to create an effective, well-structured urban environment by incorporating modern planning ideas.

[illegible]

Source<https://questionofcities.org/how-bhubaneswars-master-plan-was-overtaken-by-unsustainable-development/>

23

Figure 16

Period	Area	Ruling Dynasty	Important Temples
575 – 700 AD	North-east of Bindusagar lake	Sailodvaba dynasty, Bhauma-Kara dynasty	Parsurameswar, Swarna Jaleswar, Laxmaneswar
736 – 930 AD	West and east of Bindusagar lake	Bhauma-Kara dynasty	Vaithal, Anant Basudev, Mohini
930 – 1100 AD	South and southeast of Bindusagar lake and far east	Somavansi dynasty	Lingaraj, Mukhteswar, Kedargouri, Rajarani
1100 – 1435 AD	Far south of Bindusagar lake	Eastern Ganga dynasty	Chitrakarini, Megheswar
1435 – 1568 AD	Pockets of old town area	Gajapati Dynasty	Kapileswar

Figure 16 Historic Settlement of Bhubaneswar through the Ages

10. IMPORTANT DEVELOPMENTAL STAGES

1950s: During the first stage of development, government buildings, housing for government workers, and necessary infrastructure were built. Some of the first buildings constructed were the Assembly House, the Secretariat Building, and other administrative offices. The groundwork for Bhubaneswar's development as an operational state capital was laid during this time.

1960s–1970s: The city grew as new public amenities, medical facilities, and educational institutions were built. During this period, prominent establishments such as the Capital Hospital and Utkal University were established, which helped Bhubaneswar become a center for healthcare and education. The creation of residential areas like Saheed Nagar and Bapuji Nagar gave the expanding population somewhere to live.

1980s–1990s: Bhubaneswar kept expanding while emphasizing on enhancing connectivity and infrastructure. Major road, bridge, and public transportation infrastructure projects improved the city's internal mobility and access to other regions of Odisha. The development of industrial regions like Mancheswar and Chandaka accelerated employment creation and economic expansion.

11. THE SMART CITY INITIATIVE IN THE MODERN ERA

From the 2000s to the present: Bhubaneswar saw a tremendous increase in modernization and urbanization at the turn of the century. There was a sharp increase in the erection of multiplexes, malls, and high-rise structures in the city. With the creation of Info city and other technology parks, the IT industry started to thrive, drawing investments and generating job possibilities.

In 2015, Bhubaneswar was chosen as one of the initial 20 Indian cities to be built under the Smart City Mission. The project sought to improve the efficiency, sustainability, and livability of the city. A strong public transportation system, sophisticated traffic control, e-governance services, and the construction of green spaces and public areas were among the major initiatives.

12. PRESERVATION OF CULTURE AND HERITAGE

Despite the speed at which modernization was advancing, Bhubaneswar's rich cultural legacy was preserved. Initiatives were made to combine cultural conservation with urban growth, and historic sites such as Ekamra Kshetra were preserved. Bhubaneswar's reputation as a center of culture was upheld by the city's temples, customary celebrations, and cultural events.

13. HUB FOR RESEARCH AND EDUCATION

Prestigious universities like the National Institute of Science Education and Research (NISER), the All India Institute of Medical Sciences (AIIMS), and the Indian Institute of Technology (IIT) Bhubaneswar are located in this educational powerhouse. These establishments have established the city as a hub for research and higher education, drawing scholars and students from all around the nation. Going forward, Bhubaneswar wants to strike a balance between sustainability and expansion. The improvement of infrastructure, raising living standards, and encouraging inclusive growth are the main objectives of the city's development goals. To make Bhubaneswar a model for urban development in India, smart city initiatives are still evolving.

The evolution of Bhubaneswar from a medieval temple town to a contemporary metropolis is a prime example of well-thought-out urban development. The city's journey positions it as a dynamic, forward-thinking, and energetic metropolitan hub, demonstrating its ability to embrace modernization while conserving its rich cultural and historical heritage.

14. CONCLUSION

The historical context reveals that Ekamra Kshetra, along with nearby sites such as Khandagiri-Udaygiri, Sishupalgarh, and Dhauli, represents a unique historical heritage of significant archaeological value. While it continues to be an important Shaiva pilgrimage center, it has not been a major urban center since the Mauryan period. With the establishment of the new Bhubaneswar as the capital of Odisha, the old town has faced increased threats from urbanization, largely due to a lack of balanced planning for the new city. This lopsided development has been exacerbated by the low prioritization of the old town area.

The proliferation of diverse sects within Hinduism has led to intricate processes of transformation and adaptation in the cultural landscape. This exceptional sacred landscape persists to the present day, exhibiting a remarkable array of resources that reflect various typologies. The objectives of this research are to examine the evolutionary processes and the dependent variables associated with Ekamrakshetra, situating this analysis within the framework of various historical periods and in relation to the dynamics of urban development and to evaluate how urbanization affects the distinctive characteristics of Ekamra Kshetra's historic urban core. The study aimed to assess the impact of urbanization on the areas surrounding the Ekamra Kshetra precinct, which is an urban core rich in cultural and architectural heritage. Additionally, the study sought to examine how these changes impact the cultural and architectural identity of the city. The studies conducted indicate that the increase in population, commercial activities and shifts in land-use patterns are affecting the traditional character of the area. Historic buildings, which were once constructed using locally sourced materials, are

increasingly being replaced or modified with modern construction techniques. The spatial layout and street character of the Ekamra Kshetra area, once defined by low-rise, traditional buildings, are now being transformed into mixed-use or fully commercial spaces. Unfortunately, there has been little to no effort to conserve the cultural heritage of the city.

CONFLICT OF INTERESTS

None.

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