

PERI URBAN AREAS – THE NEGLECTED SHADOW ZONE OF THE CITY – CASE STUDY KOLKATA METROPOLITAN AREA, INDIA

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Abstract: “Thin shadows, hollow shadows, shadows deep black

The shadow of a tree is better than a tree, always have our back”

-SUKUMAR RAY (Bengali writer and poet 1888-1923, Kolkata, India)

Objective: In the past bygone eras, because of urbanisation and spatial development of urban communities past their city limits, complex interaction between the city and its encompassing rustic regions have happened, ushering in new developments in its surrounding or shadow zone. The shadow zones created by people, trying to migrate to the cities /metropolises for livelihood, education or health systems, but for better affordability settling down in the immediate neighbourhood or surrounding areas. There are multiple number of definitions for these shadow zones, because of their diversified character as far as land and water use, occupational shift, socio-cultural pattern changes. Most peri-urban regions, explicitly those around enormous metropolitan urban centres like KOLKATA, are progressively adapting to the complex environment therein, which call for unique administration structures past rural urban binaries. The shadow created by the metropolis needs to have a defined/demarcated boundary by a clear-cut methodology.

Conclusion: The main focus of this research paper is to evolve with the idea of creating such methodology beyond the already existing ones. The methodology involves collection of data from primary and secondary sources for the case of Kolkata Metropolitan Region. It deals with socio-economic, and land use characters to reach the goal to find out the uneven, far located, fragmented, and linearly developed shadow zones of the city –the Peri urban. The comprehensive study also focuses in predicting the sustainable development of the shadow zones through recommendation.

Synopsis:

The research paper focuses on defining the shadow zone –the peri urban areas of Kolkata, India. Finds out the different parameters through which predicts the future projection and layout recommendations for better management and planning for a sustainable development in the Peri-Urban Areas of Kolkata, India.

1. INTRODUCTION

The city of Kolkata (Calcutta in previous era), with its shadow zone of KMA (Kolkata Metropolitan Area) evolved out of a long history of migration in both intra and international level. Kolkata City once conceived as a neoclassical town by the British empire in the pre-independence era, grown at leaps and bounds after the post-Independence era. Kolkata (Calcutta) was not only considered to be a port city majorly regarded as a trade centre in the east India but was

developed as a major political, social and cultural centre in the entire South eastern Asia. Even the Impact of World Wars, Pandemics, Draughts or other calamities manmade or natural could not make it fall short to achieve the third and ninth rank amongst the UAs of India and World respectively by virtue of its ever-increasing populace.

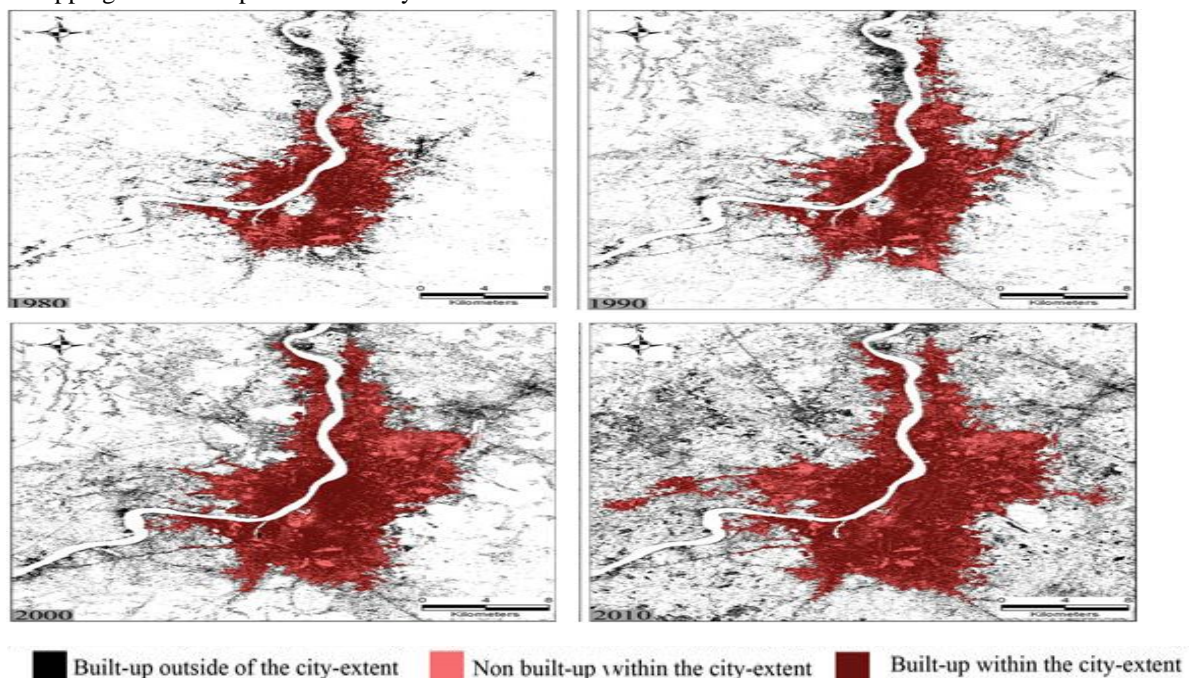
The post-independence era saw a large influx of refugees or migrants coming down to the city of Kolkata from previously known East-Pakistan, now Bangladesh, and mostly settling down in the peripheries of the city area due to affordable housing, accessible amenities and a pollution free environment, taking a brief sigh of relief in the cooler shadow zone-the peri-urban away from the hustle and bustle of the city.

The city saw its shadow growing at a larger scale and pace following the life-cycle or the growth phenomenon of moss generation, uncontrolled, unplanned, sporadic in nature. The people took the cover of the shadow, settled in and resulted to an conspicuous urban sprawl forming the greater Kolkata Region Termed as Kolkata Metropolitan Area. Undoubtedly there was no development guidelines, rules and regulations followed strictly even to develop the proper infrastructural facilities to cater to the need of the populace generated in the peri-urban.

However, in the later half of the 20th century suddenly after rediscovering the potential for development and the benefits lying within this peri-urban areas by the demand generated from the users, both the government and the private developers took interest in investing and forming proposal for new developments in the shadow zone.

With rapid development of sub-urban transport facilities and construction of affordable high-rise residential buildings and apartments more and more population influx can be seen in these shadow zones of Kolkata city. An exponential increase in urban commuters daily from the KMA area to the city core also conforms the fact. Although the fact that the rich cultural background at micro level, various ethnic groups living in different urban pockets of the shadow zone of KMA makes the boundary definitions volatile and fuzzy in nature while proliferating the complexity for analysing of the urban -rural characteristics of such areas at micro level.

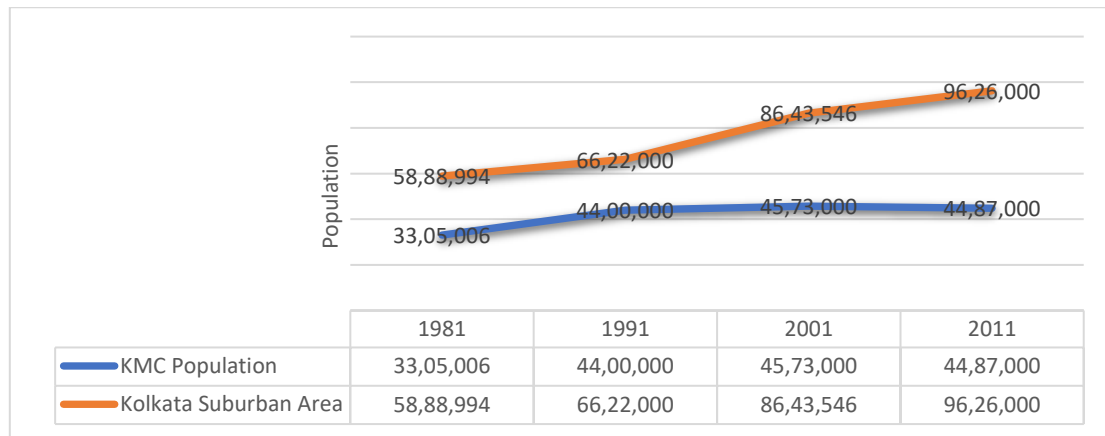
Figure 1: Mapping of Urban Sprawl of the city of Kolkata



Source: Author

As a result, the research area's factors of in-migration, population growth, and commuter traffic were examined. Specifically, the study examines the differences in population growth between the city's core, administered by the Kolkata Municipal Corporation, and its periphery. It's no secret that urbanisation is closely linked to migration, the movement of people from one location to another with the purpose of settling down.

Table 1: Population Growth analysis of KMC and KMA



Kolkata – Core city (KMC) and Sub urban (KMA) Population

Source: The Population Census of India.

Migration flow direction and volume are determined by a variety of pull and push forces which can interestingly be represented as “kumropotash” (the pumpkin-puff), a demanding character in one of the poems by the great thinker and poet Sukumar Roy. The wish master’s (here the city) command is to be followed enchantingly, affecting daily life and livelihood.

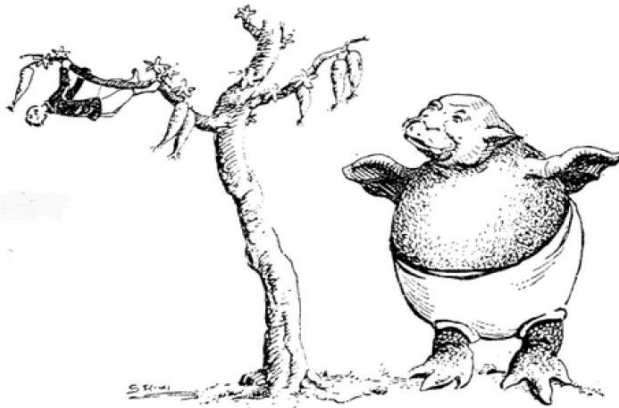


Fig. 2. Push pull factor of urbanisation represented as “Kumropotash” (“Pumpkin-Puff”); Sukumar Ray; Abol Tabol; Sukumarray.freehostia.com; Web; 10 Oct. 2012.

Migration is dominated by inward mobility in the early stages of development of any significant metropolitan centre. To be sure, its related migratory movement changes throughout time, from small town to city to large metropolis in both volume and character of migrant individuals. Urban spread begins in the peri-urban area as congestion, land rent, and other socio-economic limitations increase in the central business district. As a result, the city's second and third generations of immigrants opt to settle in the newly constructed suburbs. Their trip to the central business centre from their place of residence becomes more frequent as time goes on. Hence Kolkata Metropolitan Area (KMA) is subjected to rapid growth with over congested city-core, inefficient use of land available, uneven, far located, fragmented, and linearly developed shadow zones with varied urbanisation characteristics. Undeniably the shadow developed by the metropolis needs to have a defined / demarcated boundary with development guidelines by a clear-cut methodology. Hence in this research paper, which is part of the thesis “Development of human settlements in Peri-Urban Areas of West Bengal, in the context of the 3Gs’ (Growth, Governance, Globalisation).

2. DISCUSSION ON THEORIES AND MODELS BY EXPERTS

The theory or topic of sub-urban emerged from the west and subsequently followed the east in the globe from era as early as 1800. Different field expertise was involved based on derivation of theories, models, empirical formulas, field

research etc. But the complexity and irregularity of languages developed in these peri-urban shadow zones that the analysis and solutions were never part of the same page of the same book.

As early as 1928, Burgess proposed a city growth model based on a series of concentric zones—from the valuable land at the centre, through the zone of transition, working class homes, and better residences, to the commuter zone—where the city would expand radially. Hoyt revised this in the late 1930s, stating that growth took place in uniformly pie-shaped sectors that extended radially from the centre of the city towards the periphery of the city, rather than through rings of growth.

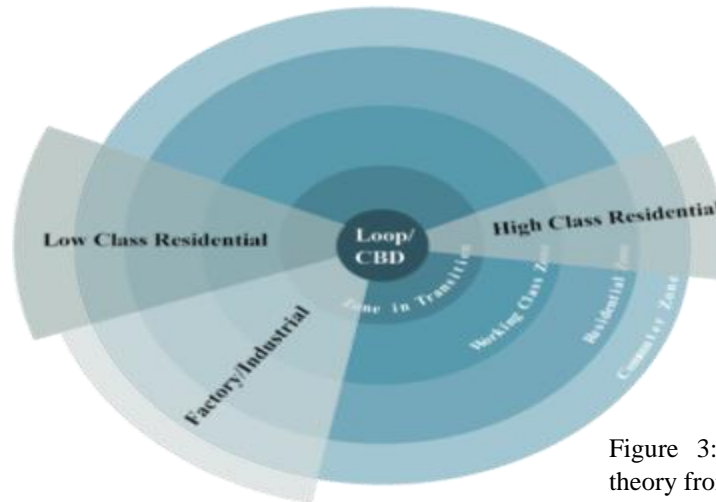


Figure 3: The concentric ring theory from the Chicago School.

LA School writers argue for polynucleation, in which cities do not grow from a single CBD but rather by the integration of several small towns or nuclei, particularly at their peripheries.

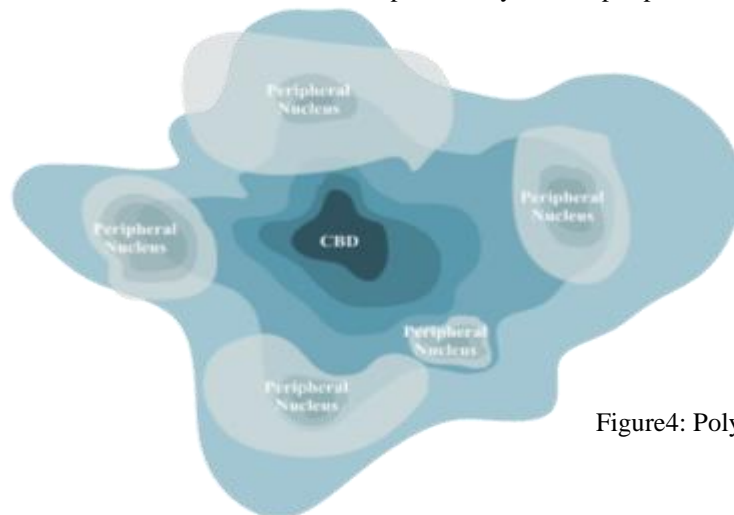


Figure4: Poly-nucleated metropolis

The extended metropolis-settlement transition in Asia" by McGee (1991) re-examines the conventional definition of urban transition in the context of a larger paradigm shift in countries' space-economy, which is quite important in the Asian context.

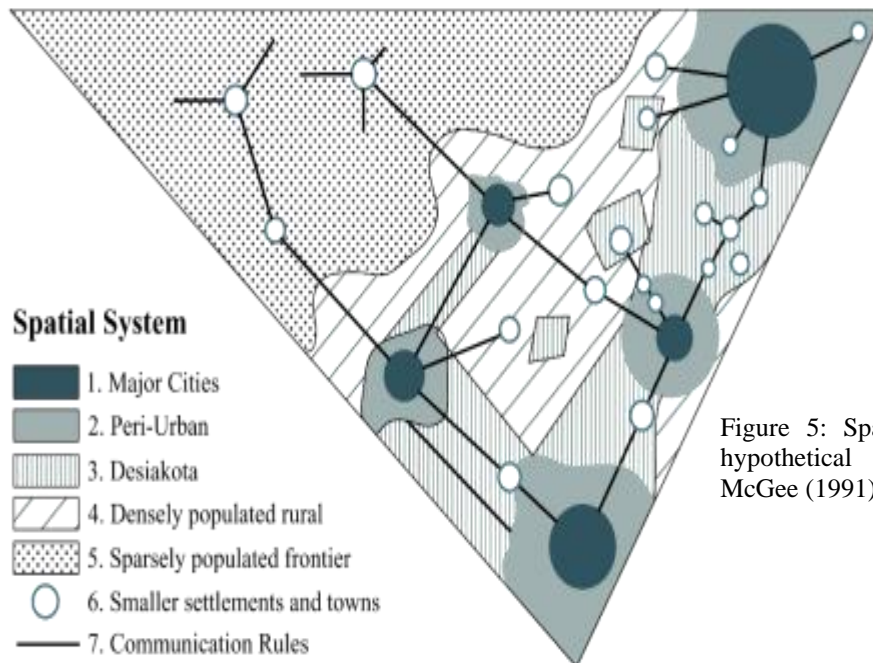


Figure 5: Spatial Configuration of a hypothetical Asian Country. Source: McGee (1991)

Following are five major regions of the space economy that are defined by McGee in his Asian country spatial configuration model: For example, major cities in Asia are dominated by one or two megacities. Peripheral urbanisation refers to the areas surrounding major cities that are easily accessible by public transportation on a regular basis. As derived from Indonesian, the term Desakotsi refers to densely populated agricultural areas that often stretch along corridors between large urban centres and are characterised by dense populations engaged in agricultural activities. rural areas with a high population density. borderlands with few people. It is defined as "the areas surrounding cities within daily commuting distance of the city core" by McGee. A city's core can be up to thirty kilometres away in some parts of Asia (1991, p. 6-7). As a result of the historical evolution of high-density and rice-growing areas, McGee believes that at least three types of spatial economy transition are occurring in Asia:

- *Desakota* Type 1 – A decline in rural settlement and land use has occurred in these areas, and the agricultural population has migrated to urban centres. Like South Korea and Japan, where most of the economically active work is not agriculture-based.
- *Desakota* Type 2 – These are areas where, over time, productivity gains in agriculture and industry, as well as population shifts from agricultural to non-agricultural, have concentrated on the core city and adjacent regions. These are also areas with rapid economic growth in comparison to the rest of the country.
- *Desakota* Type 3 – These are high-density areas with slow economic growth and a high level of involuntary economic activity. These areas are typically found along secondary urban centres.

To elaborate on this concept further, Robinson (1995) referred to the growth of mega-cities and the emerging spatial patterns in ASEAN mega-urban regions as decentralisation and dispersal. Many people believe that decentralisation and dispersal are effective methods for alleviating or decreasing the extreme negative effects of these rapidly growing metropolises. *Decentralization* occurs when people or economic activities are relocated from urban cores to peripheral areas and along major transportation corridors radiating from the urban core to the metropolitan region. People and activities disperse when they leave secondary or provincial cities or other growth centres. This decentralisation has been attributed to market forces as opposed to government policy. The majority of Asia's megacities have adopted spatial planning strategies that aim to develop a decentralised form in their metropolitan regions, recognising the advantages of polycentricity in their metropolitan regions. These are usually incorporated into the master plans of these authorities. A number of Asian mega-cities were examined by Robinson (1995), including Calcutta, Delhi and Bombay, Dhaka, Seoul and Bangkok. A significant amount of decentralisation has taken place in Asian megacities, according to the report. While the urban area/built-up has grown tremendously, most of the decentralisation has taken place along major transportation corridors leading out of the core city.

In the ODA Renewable Natural Resources Research Strategy (1999, p. 5) the peri-urban interface is defined by strong urban influences, easy access to markets, services, and other inputs, ready supplies of labour, but relative shortages of land and risks from pollution and urban growth. He referred to the rural-urban fringe as the "ultimate battleground" of environmental and socioeconomic change brought about by urbanisation. Rural-urban fringe is ignored as a specific area within urbanisation studies. The rural-urban fringe extends from the contiguous built up area of the city (no rural land use) to the area where most villages/towns show a majority of workers engaged in non-agricultural occupations (many of whom commute)' (Bentinck 2000, pp. 17-18).

Iaquinta and Drescher (2001) argued that it is not an essential element of the definition that peri-urban has to have 'proximity to the city'. It is just incidental to an elemental understanding of peri-urban. Concentration on simple geographic location as the basis for defining peri-urban misses the point of a clear understanding of rural-urban spectrum as dynamic, interactive and transformative. Thus, peri-urban is clearly more than just an urban fringe. According to Iaquinta and Drescher (2001), urbanisation is a process of concentration and intensification of human life and activity. It is an uneven process caused by three fundamental population processes that occur in a physical environment: fertility, mortality, and migration. Individual and household decisions made in a socio-cultural, economic, political, and environmental context result in such processes. Iaquinta and Drescher's peri-urban typology consists of five ideal types: Village Peri-urban, Diffuse Peri-urban, Chain Peri-urban, In-place Peri-urban, Absorbed Peri-urban, and the five elements embedded within the broader rural-urban dynamic. The typology is derived from underlying socio-demographic processes, particularly migration, in which transformative linkages are organised along migration and time dimensions. The typology is still linked through organic two-way exchange networks, which can be summarised as follows:

A summary of various typologies (Iaquinta and Drescher 2001):

- Village Peri-urban: Rural villages with an urban consciousness, these areas are geographically non-proximate to an urban area. Its designation as peri-urban rests on its social psychological transformation rather than geography and size.
- Diffuse Peri-urban: A subcategory of peri-urban that includes areas near the city that are settled based on migration. The immigrants are from a variety of geographical roots.
- Chain Peri-Urban: Geographically close to the city, this is an urban fringe that is being established through a chain migration process. Areas identified as 'squatter settlements' around metropolitan regions are mostly of this type.
- In-Place Peri-urban: Geographically close to the city, caused by in-place (in situ) urbanisation, natural growth, and some migration. These are areas that are being completely absorbed by actual urban fringe expansion or simple reclassification.
- Absorbed Peri-urban: These are areas close to or within the city that have been absorbed for a long time. These areas are derived from either in-place or chain peri-urban areas.

They argue that rural migrants first settle in villages or small towns before moving on to more urban areas, proving that the peri-urban environment is dynamic. Displacement in space and time creates two different types of links. Diffuse Peri-urban and Chain Peri-urban together most closely approximate the 'urban fringe' definition used by geographers or urbanists. In-place peri-urban has some similarities of the fringe but would more closely fit into Desakota type. Furthermore, village peri-urban has nothing to do with the concept of urban fringe. The City of Kolkata is majorly undergoing Peri-urbanisation of the categories of Diffuse, Chain, and absorbed kind. The boundary of which is still Fuzzy, Volatile, cannot be determined with any formula rather can be related to the diversified growth of moss in any suitable environment.

3. STUDY AREA DELINEATION AND ANALYSIS

In terms of key social and economic indicators, the state of West Bengal, which includes the Kolkata Metropolitan Area (KMA), ranks in the middle (Shaw, 2012). After Mumbai and Delhi, the KMA is India's third-largest metropolitan area in terms of population. Its population is 14.11 million, according to Census 2011 preliminary data, and it is located in the eastern part of the subcontinent over an area of 1,886.67 square kilometres spread across six districts. The KMA is comprised of three municipal corporations, 39 municipalities, two cantonments, one notified area, 75 non-municipal or census towns, and 446 rural bodies/villages, as shown in Table 3. This political fragmentation reflects the region's history as a major industrial area from the early twentieth century until the 1960s. Many of the

municipalities were established as jute milling towns in the late colonial period and were granted municipal status. Only 11 of the 41 urban local bodies, or 27 percent, were established after independence (1947), and the majority of these new urban local bodies are located in the northern and eastern outskirts of the Kolkata Municipal Corporation (KMC). The latter is the metropolitan area's oldest urban local body, having been founded in 1726, and can be considered the metropolitan area's core. The KMA is the most important urban region in the state, accounting for 51% of its urban population. Table 1 also shows the structure of the Kolkata Metropolitan Area by components as well as their respective geographical location. The KMC is the largest component in terms of area, with 200.71 square kilometres of land area as of 1 September 2012, and 4.49 million people in 2011, accounting for approximately 30% of the KMA population. The geographical area of the city has steadily expanded over the years, with the most recent addition occurring in 2012, when the outgrowth Joka was added to the city's south-western edge. Wards 1 to 100 have been in existence since 1965 and can be considered inner wards today, while Wards 101 to 144, which were added after 1984, can be considered outer city. It should be noted that in 2011, 40% of KMA's land was still rural, despite accounting for only 8.7% of its population. The post-independence political history of the metropolitan region is critical to understanding the region's current situation. The Left Front, which ruled West Bengal from 1977 to 2011, neglected the urban industrial sector, and as a result of the decline of the region's leading industries, jute and engineering, the state's economic performance deteriorated. As a result of rising unemployment and declining urban areas, migration into the metropolitan area has slowed. There has been a slowdown in the metropolitan area's growth pace (Shaw & Satish, 2007). State economic growth, private investment, and the information technology (IT) and services industry expanded rapidly from 2000 to 2007. Tata Motors left the state in 2007 after agitations over land in its Singur facility, and the state's economy suffered as a result. As a result of land-related issues, Mamata Banerjee's Trinamul Congress came to power in May 2011 with an overwhelming majority of the electorate. However, unlike the Left, Banerjee has worked to highlight Kolkata's cultural significance and has been engaged in its beautification and rehabilitation. Overall, West Bengal has not been successful in its attempts at large-scale industrialization in the two decades since liberalisation, but it has had some success in the take-off of the services sector, particularly in and around Kolkata. As a result, while Fordist production via large factories has not been revived, there has been increased growth in a post-Fordist services sector comprised of IT and information technology-enabled services (ITES). This has resulted in some financial success for the KMA. In 2011–2012, 14.66% of the state's urban population (43.83 lakhs) lived in poverty, compared to 22.52 percent (141.14 lakhs) in the state's rural areas (Planning Commission, 2013). There are also significant differences in the Human Development Index (HDI) between West Bengal's urban and non-urban areas (Datta, 2007). Consumption in cities has always been significantly higher than in rural areas. According to the most recent data, the average monthly per capita expenditure in rural Bengal is only 47% of that in urban Bengal. 2013 (GoI, Press Information Bureau). As a result, the pull of urban areas on rural migrants from nearby and longer distances is likely to continue, but they will not necessarily be heading to the Kolkata urban agglomeration. The national and West Bengal growth of census towns from 2001 to 2011 attests to the emergence of other urban magnets over the last two decades. This is also likely to have an impact on the city's growth and environment. Other policy changes are also on the horizon. For the first time, the state has published an urban development policy that allows for the expansion of existing buildings' floor space under certain conditions (economictimes.indiatimes.com, 2014). While this is encouraging for realtors, the changes have not yet been communicated (timesofindia.indiatimes.com, 2014).

Table 2. Annual Rates of Growth of Population in the KMA

| | 1951–1961 | 1961–1971 | 1971–1981 | 1981–1991 | 1991–2001 | 2001–2011* |
|-------------------------|-----------|-----------|-----------|-----------|-----------|------------|
| KMA municipal bodies | 2.1 | 2.2 | 1.1 | 2.92 | 2.69 | 0.64 |
| Kolkata Municipal Corp. | 0.80 | 0.80 | 0.45 | 0.63 | 0.41 | –0.16 |
| Howrah Municipal Corp. | 1.8 | 4.4 | 0.09 | 2.72 | 0.60 | 0.64 |

Source: *Based on data taken from Census of India, 2011: Population Finder on website censusindia.gov.in .Growth rates for the years 1951–1961 to 1991–2001 have been taken from the CDP for Kolkata prepared by KMDA (2007, p. 11).

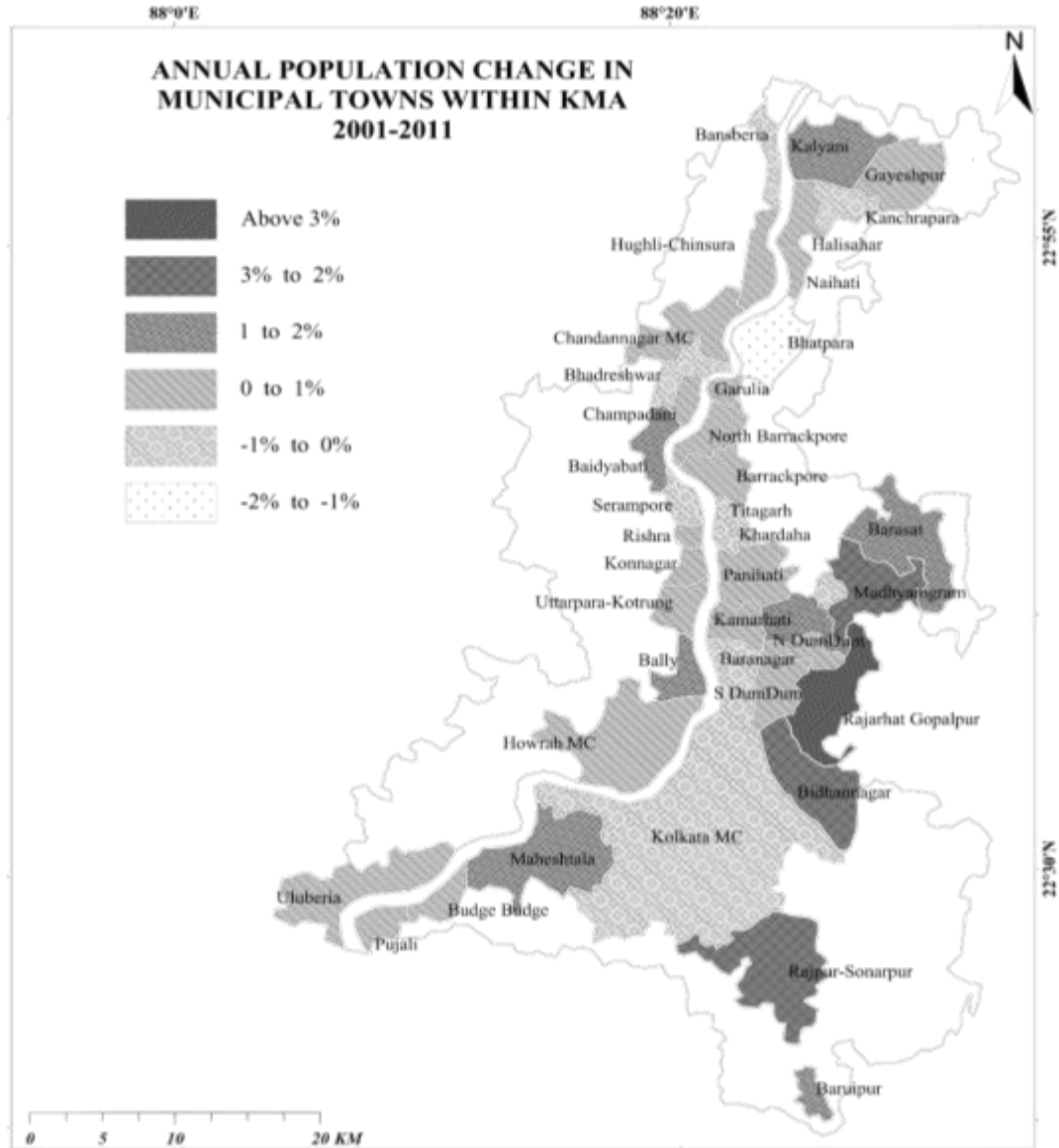


Figure 6. Kolkata Metropolitan Area: Demographic Change 2001–2011

Source: Census of India, 2001-Final Population Totals, West Bengal, Table 1; Census of India, 2011 (censusindia.gov.in), population finder.

Table 3. Composition of KMA: 2001 and 2011

| | Categories of Area | Numberin 2001 | Area in sq. kmin2001 | Numberin 2011 | Area in sq. kmin 2011 |
|---|---------------------------------------|------------------|----------------------|------------------|--------------------------|
| 1 | Municipal corporations | 3 | 271.31 | 3 | 271.31 |
| 2 | Municipalities | 38 | 615.49 | 39 | 633.41 |
| 3 | Non-municipal urban (census) towns | 77 | 200.10 | 75 | 193.98 |

| | | | | | |
|-----------|------------|-----|----------|-----|-----------|
| 4 | Outgrowths | 16 | 18.19 | 16 | 18.19 |
| 5 | Rural area | 445 | 746.32 | 446 | 769.78 |
| Total KMA | | | 1,851.41 | | 1,886.67* |

Source: 2001 data taken from CDP of Kolkata, Chapter 1, p. 1.

Note: *Area expansion occurred in 2009.

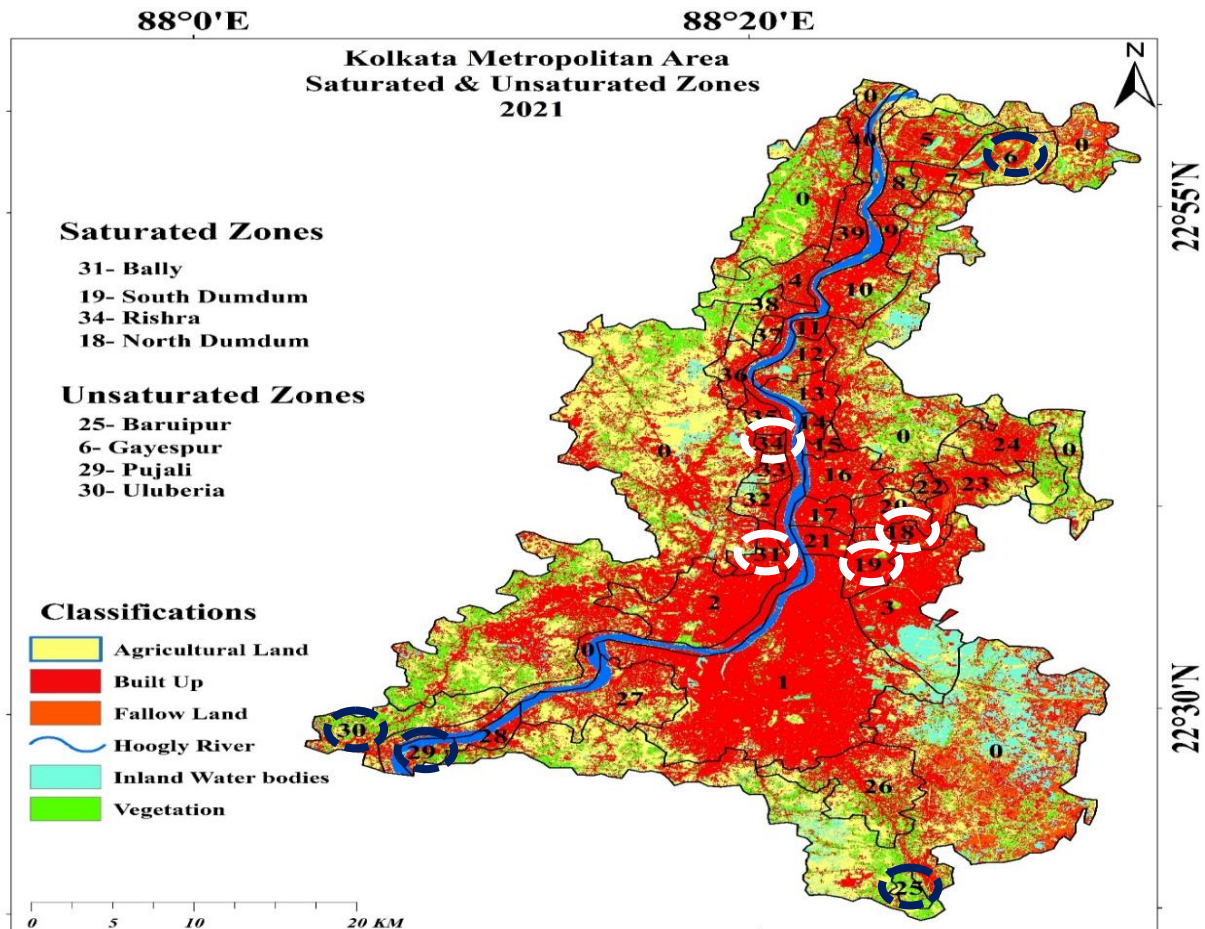


Figure 7. Kolkata Metropolitan Area: LULC Mapping , Identifying the saturated nad unsaturated patches of shadow zone (Peri-Urban). Source: Author. Landsat Data Image and GIS Mapping

Above Detail analysis done on the Demographic Changes and LULC Changes in the area of Kolkata Metropolitan area and the top most four saturated and non-saturated areas are selected. Amongst which the BaruipurMunicipality area has been taken as a micro level study for study further in pocket level shadow zones.

3.1 MICRO LEVEL STUDY OF BARUIPUR MUNICIPAL AREA

Baruipur Municipality was studied in depth as an example of a non-saturated area with potential growth. Baruipur is 27 kilometres south of Kolkata and is served by two modes of transportation: road and rail. All of the important towns and places in the South 24 Parganas district are linked to Kolkata via Baruipur. Baruipur's regional road pattern spreads out in all directions. The Garia – Baruipur Road, also known as the Kulpi Road, is one of the major roads that connects the area to Kolkata and North 24 Parganas via the E.M Bye Pass. The Eastern Metropolitan Bypass connects Kolkata's eastern outskirts, including Salt Lake townships and the rapidly expanding Rajarhat Township. Other major roads connect the area to its eastern part, including Madarat Road, Dhabdhabi Road, and Canning Road, while Amtala Road connects it to its adjacent western part. The road conditions are adequate. Other major roads connecting the area to other

regions include the Kheyadaha Road, the Narayanpur–Bodra Road, and the Chakraberia–Baruipur Road. The town is linked to the rest of the hinterland by railway. The nearest railway station is Baruipur Junction, which connects this municipality to Kolkata and the southern part of South 24 Parganas. The suburban rail services in the area help to support the area's major transit movement. It also handles the daily transportation of the majority of vegetables and fruits to Kolkata and other cities. The table below provides a demographic overview of the municipality.

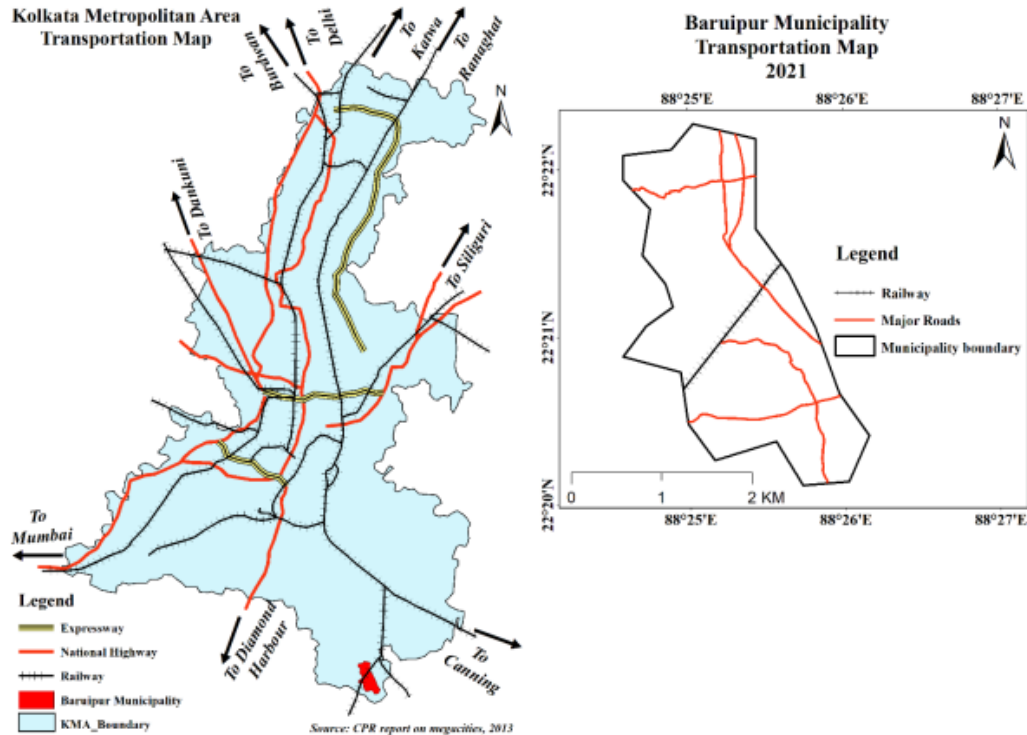


Figure8. Baruipur Municipality, the pocket shadow zone (Peri-Urban) in KMA area showing transport network.Source: Author. Landsat Data Image and GIS Mapping

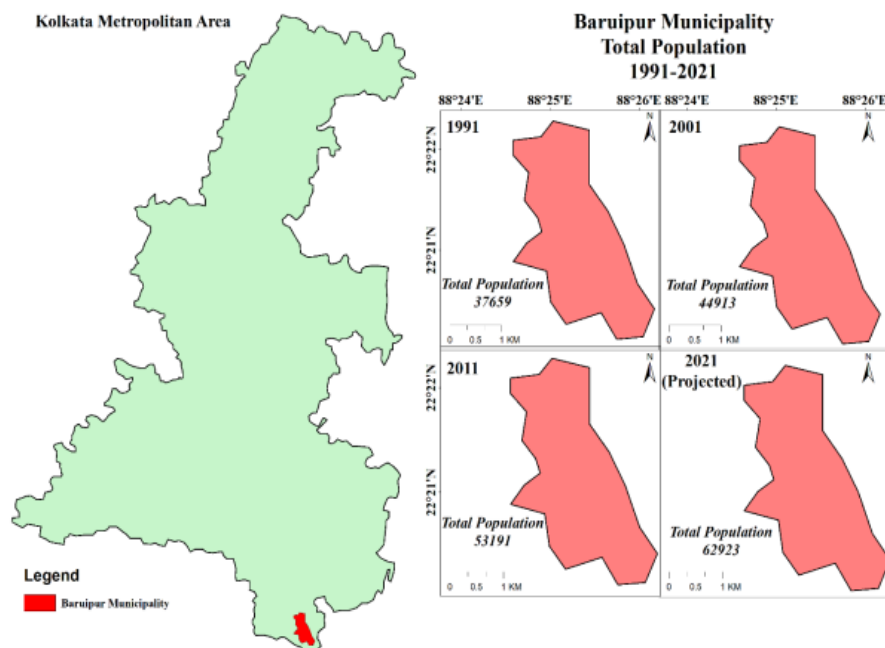


Figure 9. Baruipur Municipality, the pocket shadow zone (Peri-Urban) in KMA area showing decadal growth Source: Author. Landsat Data Image and GIS Mapping

Table 4: Overview of Baruipur Municipality

| | | | | |
|---|---------------------|-------------------------|-------------------------|-----------------|
| 1 | Population | 2001 | 2011 | 2021(Projected) |
| | | 44,913 | 53,191 | 62,923 |
| 2 | Density | 2001 | 2011 | |
| | | 7930 persons per sq. Km | 9381 persons per sq. Km | |
| 3 | Decadal growth rate | 19.26% | | |
| 4 | No of Households | 2001 | 2011 | |
| | | 9608 | 13403 | |

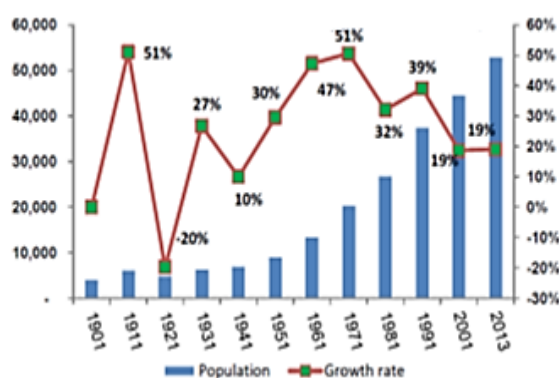


Figure 10: Population and Growth rates of Baruipur

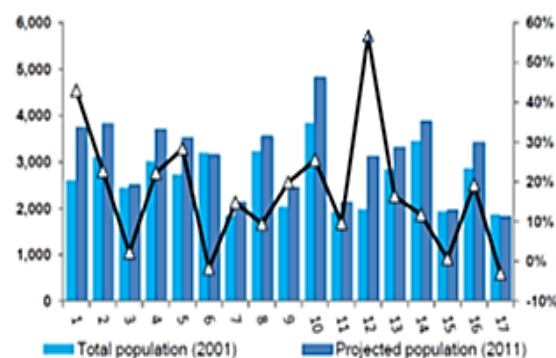


Figure 11: Ward wise Population and Growth rates of Baruipur

Source: Census, and Baruipur Municipality

Baruipur's projected population in 2013 is expected to be around 55, 628 people. When compared to the total population of West Bengal and the South 24 Parganas district, the population of Baruipur is relatively small. According to the 2011 census, the population of Baruipur is only 0.06 percent of the state and 0.7 percent of the district population. Baruipur with its negligible share of the population in comparison to the population size of South 24 Parganas district is driven by factors such as i) nearly 75 percent of the population of South 24 Parganas seems to be rural, and ii) of the residual 25 percent population, which is urban, municipal authorities such as Maheshtala and RajpurSonarpur are predominant, with their accumulated share recording more than 40 percent while Baruipur only accounts for 3 percent of the share of Urban Population. However, in terms of population growth rate, Baruipur has recorded around 19.2 percent growth, which is higher than West Bengal's (13.8 percent) and South 24 Parganas' (18.2 percent) decadal growth rates between 2001 and 2011. The figure above depicts the population size and growth pattern of Baruipur over the last 100 years. Figure 10 & 11 demonstrates that:

- Between 1951 and 1991, decadal population growth was extremely rapid, with the highest rates recorded during 1961-71 and 1971-81 being more than 50% in each case. This is due to inward migration from Bangladesh at the time, as South 24 Parganas shares a border with Bangladesh.
- Ward-by-ward population size analysis clearly establishes the municipality's growth direction, as explained in the preceding section. Figure 12 shows that the northernmost part of the municipality, which consists of four wards (1,2,12, and 13), is much more populated (average population size is around 3500) than the southern part of the municipality, which consists of five wards (6,7,8,9, and 16) and has an average population size of around 3000. Ward 10 is the municipality's most populous ward, located in the municipality's central region.
- Similarly, when the population growth rate (2001-2011) is calculated, the northernmost wards show a 35% growth rate compared to a 12% growth rate in the municipality's southern region. Due to the rural nature of the South 24 Parganas district, the total geographical area of the municipality in relation to the total geographical

area of the South 24 Parganas is less than 1% of the total geographical area. As of 2013, the population density was 9381 people per square kilometre, which is considered to be on the low side.

As it is enclosed by a number of villages and its structure is elongated around 4.3 km from north to south, the formation of settlement pattern of Baruipur is strongly influenced by its location, shape, transportation route, and surrounding rural population. Kolkata is located in the municipality's northern outskirts. The city is expanding rapidly, particularly to the north. It is for this reason that most areas of Northern Municipality have seen expansion, primarily in the real estate sector. As a result of this, the development of the municipality's southern part has been uneven. In terms of ward-wise building plans sanctioned by the municipality during the 2007-12 period, analysis shows that the maximum number of building plans were sanctioned in wards 4 and 10, followed by wards 1,6,12, and 14 with more than 150 building plans sanctioned in each ward. Wards such as 3, 7, 9, 15, and 17, on the other hand, have had a low number of building plans approved in the last five years (less than 60 no. during 2007-12). This is accurately reflected in the table below, which shows the most promising wards in terms of growth as measured by the municipality, as well as the underlying reason for the growth in these wards.

Table 5: Growth Patterns& drivers in Baruipur Municipality. Source: Field Survey by Author

| Area/ Ward | Nature of Growth | | | Growth Drivers | | | |
|---------------|------------------|------------|----------|--------------------------------|-------------------------|----------------|--------------------------|
| | Residential | Commercial | Industry | Pressure from adjacent village | Proximity to Employment | Infrastructure | Vacant Land availability |
| 1 | ✓ | ✓ | | | ✓ | ✓ | ✓ |
| 2 | ✓ | ✓ | | | ✓ | ✓ | ✓ |
| 4 | ✓ | | | ✓ | | | ✓ |
| 5 | ✓ | | | ✓ | | | ✓ |
| 6 | ✓ | ✓ | | ✓ | | ✓ | ✓ |
| 10 | ✓ | ✓ | | | ✓ | ✓ | ✓ |
| 12 | ✓ | ✓ | | | ✓ | ✓ | ✓ |
| 16 | ✓ | | | ✓ | | ✓ | ✓ |

From the above table, following key points are coming out:

- Wards 1, 2, and 16, the city's three northernmost wards, have experienced significant growth, owing primarily to their proximity to Kolkata and the availability of vacant land.
- Four wards (4,5,6, and 10) in the city's central zone have grown in recent years, owing primarily to the availability of vacant land and, to a lesser extent, to inward migration from adjacent rural areas, which has resulted in residential growth.

In contrast to the preceding, the growth dynamics of the area in terms of upcoming real estate projects are observed to be much more prominent in the municipality's outskirts. Due to the abundance of vacant lands available in the municipality's adjacent village Mouzas, a number of private developers are planning large residential projects. Vibgyor Group, Sharda Group, and others are notable examples.

According to the GIS Platform, the total area of Baruipur is 567 Ha or 5.67 square kilometres. The various utilities and detailed features of Baruipur Land use were mapped in GIS and broadly classified in accordance with UDPFI guidelines.

Table 6: Land use distribution of Baruipur.

| | Land Categories | Area in Sq. Km | % of the Total area | | Land Categories | Area in Sq. Km | % of the Total area |
|----|-----------------|----------------|---------------------|----|-----------------|----------------|---------------------|
| 1. | Residential | 3.09 | 54.4% | 6. | Agriculture | 0.38 | 6.7% |
| 2. | Commercial | 0.04 | 0.7% | 7. | Plantation | 0.76 | 13.5% |

| | | | | | | | |
|----|----------------|----------------------|-------|----|-------------|------|------|
| 3. | Institutional | 0.06 | 1.1% | 8. | Water body | 0.46 | 8.0% |
| 4. | Transport area | 0.59 | 10.4% | 9. | Vacant land | 0.22 | 3.9% |
| 5. | Recreational | 0.07 | 1.2% | | | | |
| | Total Area | 5.674 Area in Sq.Km. | | | | | |

The existing land use/land cover map of Baruipur town was created using high resolution WorldView-2 satellite images. The information was analysed and visualised using GIS software. Ground-truthing and field surveys were used to validate the data derived from satellite images. The municipality's area is 9.07 square kilometres, according to census, DDP, and other publicly available reports. However, after completing GIS slum boundary validation and municipality boundary demarcation, the municipality's area has been estimated to be around 5.67 square kilometres. As a result, in this report, the total area is 5.67 square kilometres, which is our estimate, rather than 9.07 square kilometres.

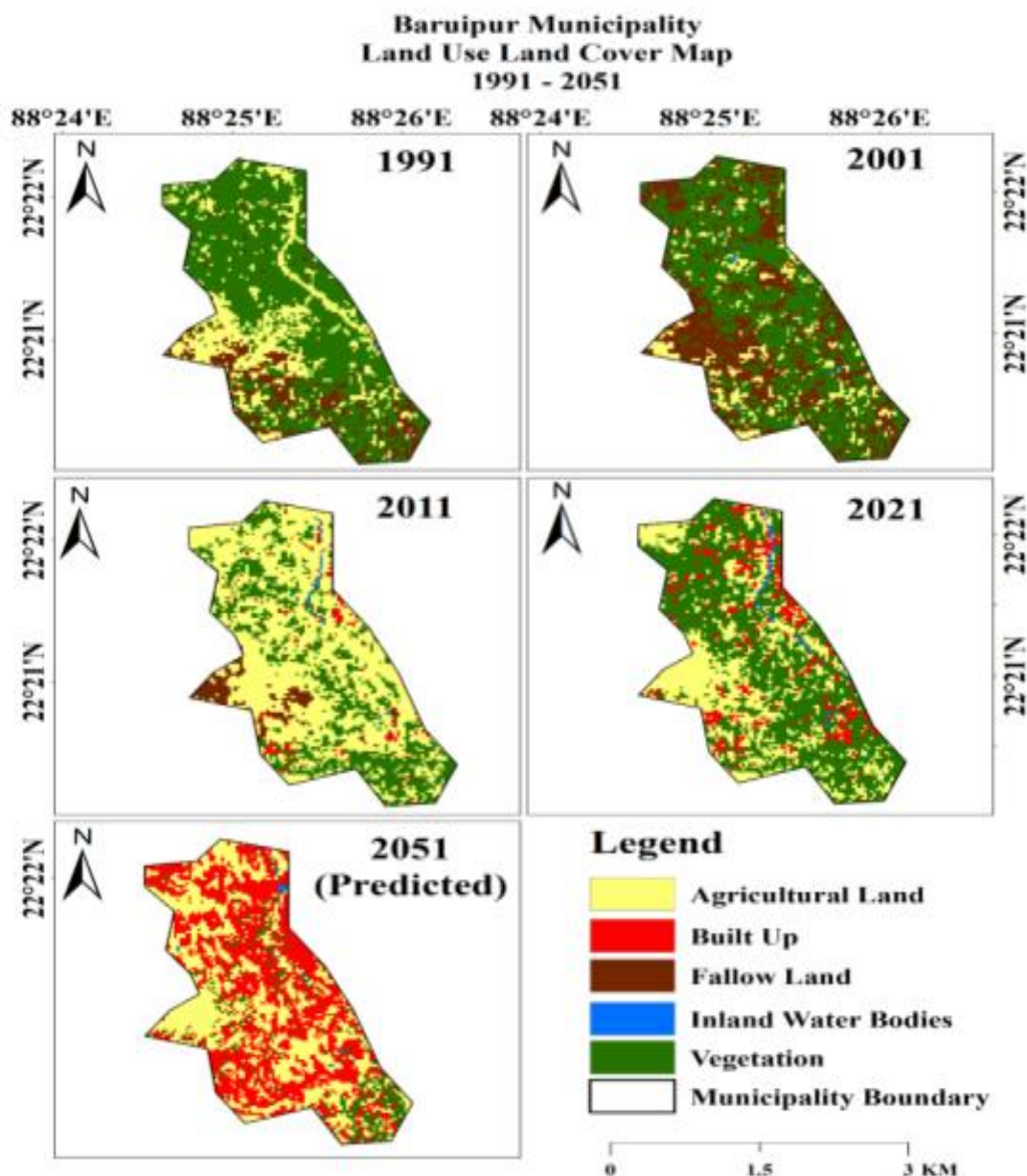


Figure12. Baruipur Municipality, the pocket shadow zone (Peri-Urban) in KMA area LULC Mapping. Source: Author. Landsat Data Image and GIS Mapping

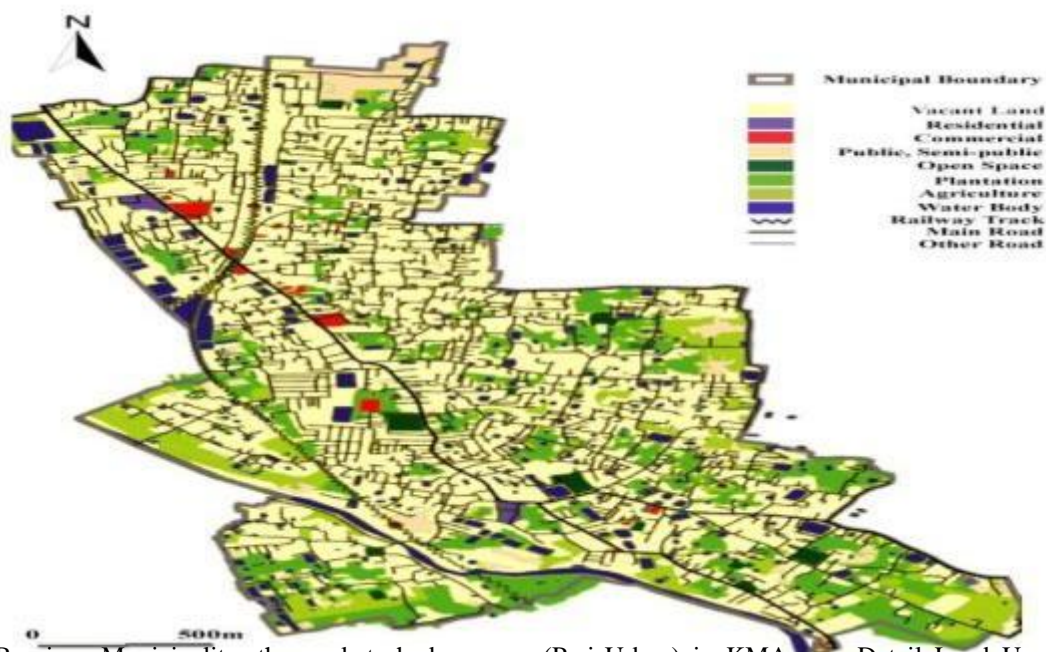


Figure13. Baruiipur Municipality, the pocket shadow zone (Peri-Urban) in KMA area Detail Land Use Mapping.
Source: Author. Landsat Data Image and GIS Mapping

Because Baruiipur is primarily a residential area with few industrial activities, the industrial and commercial zones have been combined. Baruiipur is home to 25 educational institutions and 16 health care facilities. All of these have been categorised as Institutional. Baruiipur's land use pattern is heavily influenced by the main road and rail route, as well as its proximity to Kolkata. As a result, the main residential, commercial, and public-semi-public areas are concentrated along the transportation route, with a focus on the north. Agricultural and plantation areas are mostly concentrated on the southern outskirts. The image below depicts the land use characteristics of the shadow zone of Baruiipur.

According to a household survey, four out of every hundred households in the district of South 24 Parganas do not have a place to sleep at night, and another half of the households live in a house/hut with only one room. 45 percent of households in Baruiipur live in pucca or partially pucca houses. Housing in its slums is in poor condition, with 80 percent of houses being Katcha or semi-pucca. Considering the foregoing, the municipality has already begun piecemeal construction of affordable houses in 40 slums spread across 17 wards, leveraging the BSUP scheme in a phased manner. During the first phase (2008-2012), 543 houses were built in 29 slums spread across 12 wards. Infrastructure projects such as road, drainage, and pipeline construction were also prioritised in some of the slums. 1102 dwelling units were built in the second phase (2009-ongoing) until 2012, along with a CC Road, a shallow drain, and a water supply distribution line.

Baruiipur Municipality has a water supply deficit that is expected to grow to 7.69 MLD in 2016. The population does not have access to water in the areas served by piped water supply because water supply is intermittent throughout the town and only available for 6 hours a day, and water in some slum pockets contained arsenic. Taking into account the aforementioned gap, the Baruiipur Municipality has initiated a water supply project under JNNURM to improve the situation in all 17 wards of the Municipality. The project, which is being carried out by the Kolkata Metropolitan Water Supply and Sanitation Authority, entails the construction of i) one semi-underground reservoir with a capacity of 0.25 million gallons, ii) clear water pumps, and iii) a booster chlorination plant, among other things. There is no household level drainage facility in slums, resulting in an unsanitary environment. A number of interventions are required to improve sanitation and sewerage facilities. The Municipality of Baruiipur's solid waste management is not in accordance with the MSW (Management and Handling) Rules 2000. Garbage is collected from door to door by tricycle vans from all wards and temporarily stored in Municipality-managed vat points (primary collection centres). There is also a lack of timely collection and disposal to the existing dumping ground in Ward 8, resulting in dumping in drains and the spread of foul odours in the primary disposal point. Baruiipur's road network has expanded to 123 kilometres. While more than 60% of roads are black-topped and concrete, approximately 16% of the road network is still katcha

road, and 23% is brick road. The majority of existing arterial roads are narrow, with two-lane carriageways, and must be widened to accommodate increased vehicular traffic. The surface conditions of the roads are poor due to a lack of proper maintenance, which reduces the speed of moving traffic. Several initiatives and infrastructure development projects, such as KUSP, BSUP, SSHUP, and JNNURM, have been undertaken in recent years.

4. CONCLUSIONS

What has been revealed so far is the clear ordering in time hypotheses generated in the working brief. the development authorities' early modernisation strategies in the 1960s and 1970s, in which a larger metropolitan region was circled-in around the city, then regarding the complexity of settlement patterns characterised by heterogeneity and segmentation underpins the postmodern dynamics of the 1980s and 1990s, in which the dynamics of global capitalism introduces a variety of actors in the city caused the inter-dependency of the dynamics of transformations in the peripheral shadow zone of the city to that of the more central areas. In the act of turning the city inside out, acute contests are clearly visible at the edges, raising issues of governance as well as socio-spatial representations. As a result, Shadow Zones are emerging as the new reification zones. The panchayat unions are inadequate in the face of the overwhelming desires of the city corporation, which is in turn overshadowed by the aspirations of the metropolitan development authorities. In the midst of all the regulatory ambiguity, powerful private actors (primarily developers) pit one form of governance against the other in order to capture the best for themselves, while citizens (whether rich, middle-class, or poor) are left to forge their own geographies in a pool of contested landscape. Worse, public services are being diverted to glorify an abstract global status, with politicians seeking symbolic significance in their metropolitan imagery rather than seeking solutions to more pressing socioeconomic problems, simply because such concrete urban realities are not associated with the global platform. Peripheries have risen from marginality to centrality in this pocket-oriented quest, becoming locations of proscriptions for the poor and prescriptions for the rich. In the opinion of urban professionals, it is a mostly urban or a rural and urban area, and in the opinion of rural specialists, it is a primarily rural area. But while the shadow zones suffer from pollution created by surrounding urban centres, natural resource managers regard it as a problem region where buildings and highways infringe on productive agricultural land, which is what environmentalists call "shadow zones." They unanimously agreed that "shadow zone" or "peri urban" is an area outside of current urban areas that is undergoing significant changes across time and space, according to the examination of the literature conducted for this project. As part of a city's long-term growth, the area must be specified in stages, and the data must be updated regularly. (DFID 1999).



Fig. 14. The ever changing shadow zone (the Peri-urban, remains unfathomable "Chayabaji" ("Playing with the shadow"); Sukumar Ray; Abol Tabor; Sukumarray.freehostia.com; Web;

Due to the city's ageing infrastructure and housing stock and lack of an economic magnet, Kolkata Metropolitan Areas central area in the city of Kolkata with its oldest wards, is becoming a decaying urban with an ageing population. The newer outer areas or the shadow zones of the Kolkata Metropolitan Area, on the other hand, are still undergoing active residential infilling and population growth. Their infrastructure, roads, sewer system, police stations and police outposts are still in the process of being built. A consolidated urban policy or guideline that simultaneously takes into consideration the challenges in the areas in the Shadow zone is clearly needed. Further densification of the older areas through residential high rises may be counterproductive as they already have high population densities. Their economic revival would be a better option. Such efforts would need to be supplemented with improved public services, such as, better solid waste management. In the newer wards, the timely completion of road, rail and sewerage projects is important as is the need to create housing for all income groups. Slums and squatter settlements need to be rehabilitated and social facilities, such as schools and medical institutions, need to be created. Finally, using all available non-

residential land now by the development authorities, such as, developing them to provide services or as sites for new economic activities would benefit the entire region of the shadow zone along with the city core.

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