



Historical Analysis of Urban Morphology: A Coastal City Model of Lasem, Java, Indonesia



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Abstract: Historical records indicate that Lasem, a petite coastal town in Java, Indonesia, boasts a rich lineage commencing around 7-8 AD. Several distinct periods, encompassing the Hindu-Majapahit, Islamic, Chinese-Muslim, Colonial, Japanese, Independence, and Post-independence eras, have been identified as shaping the town’s evolution. This study endeavored to elucidate the urban morphological shifts observed in Lasem over these diverse epochs, intending to derive a model for small coastal cities. Utilising a qualitative case study methodology, data was extracted from Pratiwo’s sketch map, supplemented by historical maps archived in kit.nl.lv and the Tropen Museum collection. By juxtaposing the temporal modifications of Lasem’s structure, connections were drawn with extant theories. The resultant findings reveal a city morphology moulded by both constant (rivers and squares) and evolving structural elements (notably the introduction of Daendels Street and the railroad during colonial rule). Distinctively, Lasem’s configuration diverges from typical Southeast Asian coastal towns, primarily attributed to its modest size, which obviated the construction of Dutch defensive forts. Consequently, the formulated model for Lasem presents a four-stage developmental sequence, uniquely omitting the ‘fort city’ stage commonly observed in coastal city frameworks. This novel model furnishes profound insights into the urban morphology of comparable coastal towns, offering a robust platform for devising tailored urban planning and developmental stratagems for similar contexts.

Keywords: Coastal city; Small town; Urban morphology; Lasem

1 Introduction

Lasem, a petite town nestled within Rembang on Central Java’s northern coastline, possesses an extensive historical narrative, with origins tracing back to 7-8 AD. Despite its small stature, the town’s allure as a trading hub was apparent, as evidenced by the early Chinese traders docking at the Lasem harbour in the 13th century. The town’s docking points were distinguished as either harbours or ports. Historical records suggest that a riverine route connected Lasem’s inland territories, corroborated by archaeological remnants such as ship anchors, shipyards, and Chinese ceramics discovered along this path [1]. Such evidence, particularly of substantial ship landings, underscores Lasem’s historical significance. The natural course of the river, previously a pivotal transportation conduit, was instrumental in the formation of Lasem’s morphological attributes. Settlements emerged along its banks, notably within Babagan, Dasun, Karangturi, and Soditan villages. Under indigenous governance, urban densities gravitated towards the port vicinity. Initial Chinese settlements materialized proximate to these wharves, accompanied by governmental centres, markets, and town squares. Intriguingly, despite Lasem’s diminutive nature in the present day, its inherent magnetism as a historical urban centre remains undiminished.

Since the 19th century, Lasem, once renowned for its bustling shipyards, has witnessed a discernible decline, largely attributed to the siltation of the Lasem river. Throughout its storied evolution, Lasem has undergone myriad phases of rise and fall, each of which has indelibly shaped the city’s present-day visual landscape [2]. By 1925, Lasem had evolved into a modern urban centre [2], but this period of flourishing was short-lived. Subsequently, the city experienced a marked degradation, evolving into a directionless urban entity, the decline of which profoundly impacted the urban milieu. Several intertwined factors contributed to this downturn. Political elements, particularly during the Dutch and Japanese colonial eras, exerted significant influence on Lasem’s urban morphology. This

was succeeded by social upheavals during the Old Order, and physical constraints in the New Order period, during which stringent governmental mandates dictated that certain structures, notably those of Chinese residents, remained open. The economic landscape during the reform era further compounded these challenges. Collectively, these determinants precipitated a notable regression in the city's developmental trajectory, pushing it to the brink of urban decay.

Following Lasem's period of decline during the reformation era, the city has attracted the attention of historians, archaeologists, and scholars alike, who have commenced research and proposed its designation as a cultural heritage site. While numerous historical remnants in Lasem continue to stand resolutely, some display signs of wear due to the passage of time. Notably, several Chinese residences, vacated as their inhabitants migrated to urban hubs like Jakarta, Surabaya, and Semarang, bear visible signs of aging. The cultural and architectural value of Lasem's heritage - encompassing both tangible structures and intangible traditions - remains underappreciated, leading to instances of neglect [3]. Over time, the original site of Chinatown in Lasem has undergone modifications and residential expansion, consequent to urban growth. Therefore, it becomes imperative to investigate the impact of Chinese settlements, or Chinatowns, on Lasem's urban evolution. Grounded in the city's chronicles, spanning from the Majapahit era to the post-independence period, shifts are discernible which have left an indelible mark on both the city's fabric and Lasem's broader development. Consequently, the pivotal research inquiry posed is: What constitutes the morphology of the city of Lasem? The objective of this investigation is to scrutinise the urban morphology of the petite coastal city of Lasem across historical epochs, endeavouring to conceptualise a model for small coastal urban development.

The paper is structured as follows: The introductory segment offers an exposition of Lasem's historical context, the central research inquiries, and the objectives of the study. Subsequently, an examination of pertinent literature addressing the morphology of coastal cities is undertaken. The theoretical delineation drawn from Widodo [4], which serves as a comparative benchmark against Lasem's coastal city model, pertains to the coastal city model of Southeast Asia. In the section detailing research methodologies, elucidations on data procurement, the instruments employed, and the processes and methodologies adopted to address the research questions will be provided. The concluding sections will illuminate the outcomes of the data analysis and engage in a discourse on the implications of these findings for the realm of urban planning.

1.1 Coastal City Morphology

Within the Southeast Asian precinct of former Dutch colonies, a distinctive five-phase progression delineating the morphology of coastal cities has been identified [4]. These phases encapsulate:

A. Trading post: Phase In the nascent stages of European incursion, the morphological blueprint was predominantly characterized by trading post edifices and strategic placements of Chinese settlements. The presence of such trading posts, exemplified during the early Portuguese era, can be discerned in instances like Sunda Kelapa.

B. Colony fortress: Phase Subsequent to the European departure from their initial settlements, the morphological shift evolved to manifest Chinese settlements that served as ephemeral trading hubs. Coastal cities reflecting this fortress typology can be witnessed in historical accounts from locales such as Malacca, Penang, Batavia, and Semarang.

C. Fortress city: A pronounced change was observed when European powers elected to encircle their cities for enhanced security, pushing Chinese settlements beyond these fortifications. Morphological evidences from Malacca, Batavia, and Semarang illustrate these fortresses functioning predominantly for military safeguarding.

D. Cities of segregated ethnicities: Following the comprehensive European dominion over these cities, a new morphological pattern emerged, wherein residential demarcations were distinctly aligned with ethnic or racial groupings. Whilst such ethnic segregations were implemented in strait regions, including Malacca, Penang, and Singapore, it was noted that the strictness in enforcing these segregations varied. Consequently, urban societies got compartmentalized into three distinct sections: Europeans, Chinese, and other foreign nationals.

E. Pre-modern city: The dawn of the pre-modern era ushered in a morphological transformation reflecting a contemporary coastal city. Salient characteristics of this phase included cities being outfitted with avant-garde facilities and infrastructural advancements, compounded by city expansions attributed to burgeoning urban populations.

An overview of each phase can be seen in Figure 1.

The emphasis of Widodo's seminal work revolved predominantly around the Dutch colonial era, pertaining to the morphological phases of coastal cities in Southeast Asia. Notably, Lasem, with its diverse historical epochs—encompassing Hindu-Majapahit, Muslim, Muslim-Chinese, Dutch, Japanese, Independence, and post-Independence periods—witnessed an overlap of its historical trajectory during the Dutch dominion.

In the study, a lucid exposition of the morphological phases germane to Southeast Asian coastal cities has been furnished. Nevertheless, when the application of these morphological concepts is considered within the Lasem context, certain phases manifest with greater relevance than others.

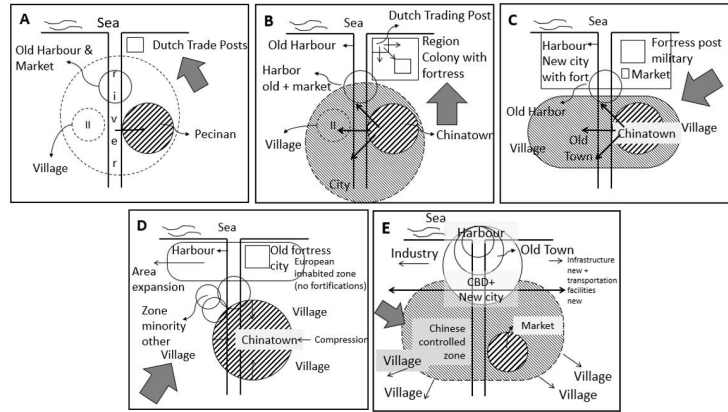


Figure 1. Morphology of coastal cities in Southeast Asia based on Widodo [4]

2 Methodology

In discerning the morphological transitions of coastal cities, particularly in Lasem, a qualitative approach was employed. Such a selection stemmed from the inherent complexities associated with capturing the temporal dynamics of city morphology using quantitative metrics. It is contended that the determination of a research design is often influenced by the nature of the research problem, experiential knowledge, and the envisaged readership [5]. The distinctive nature of Lasem City's coastal morphology presents challenges to quantitative evaluations. By virtue of a qualitative methodology, nuanced morphological attributes, encompassing traditional spatial configurations, land utilisation, and architectural facets, could be probed and delineated. This qualitative lens offered an adaptability in data collection, permitting alterations based on field exigencies and prevailing circumstances. Data, as postulated by Siyoto and Sodik [6], remains a raw entity, often bereft of inherent significance, encompassing myriad forms such as situational contexts, imagery, or alphanumeric values.

For this study, data acquisition bifurcated into primary and secondary channels. Primary data, sourced directly from fieldwork [7], entailed observational techniques to appraise physical infrastructural nuances, from road designs to architectural blueprints. Informative dialogues were initiated with edifice proprietors, local denizens, and researchers of parallel academic pursuits. The qualitative realm rarely imposes constraints on sample sizes. Often, diminutive samples, in some instances singular informants, suffice, given the criteria of adequacy and appropriateness [8].

Semi-structured interviews constituted the primary data collection mode, aiming to glean insights into transformation patterns. Prior to these dialogues, informed consents, encompassing research objectives, data utilization, and participant rights, were procured from respondents. Secondary data, conversely, emerged from scholarly reviews, seeking comprehensive insights that could enhance analytical depth. Such data was extracted from academic articles, archival books, and historic cartographic representations, particularly focusing on Lasem's urban history and its morphological implications.

To address the primary research question, "What is the morphology of coastal cities in Lasem", the subsequent steps were undertaken: a) Elucidation of Lasem's broad urban context, inclusive of historical and cultural facets; b) Morphological evaluation of Lasem, focusing on road architectures, land partitions, structural entities, and urban frameworks; c) Chronological demarcation of Lasem's coastal urban evolution, synchronized with Indonesian urban trajectories; d) Comparative analysis between Southeast Asian coastal cities and Lasem during the Dutch colonial epoch, drawing parallels with Widodo's theoretical constructs [4]; e) Historic event documentation across each phase, facilitating insights into morphological transformations; f) Analytical review of discerned shifts, culminating in key findings and conclusive statements.

3 Results

3.1 Geographical and Architectural Overview of Lasem

Situated within the jurisdiction of Rembang Regency, Lasem can be geographically pinpointed between coordinates $111^{\circ}00' - 111^{\circ}30'$ East Longitude and $6^{\circ}30' - 7^{\circ}00'$ South Latitude. The specific location of Lasem, depicted in Figure 2, lies towards the eastern domain of the Rembang district. A noteworthy feature of the area is the traversing Pantura highway, extending from West to East. Rembang shares its boundaries directly with East Java. Owing to its strategic geographical stance, Lasem emerges as one of the few regions nestled along the coast of the Java Sea, a mere 12 km East of Rembang. Geographical delineations are defined by the Java Sea to the north, Pancur district to the south, Sluke district to the east, and Rembang district to the west. Lasem spans an expansive 4,504 ha, wherein

residential zones occupy 505 ha, aquatic ponds spread across 281 ha, and state-administered forests envelop 624 ha. Furthermore, Lasem's administrative division comprises 20 villages, as visually represented in Figure 2.

Field observations revealed intriguing architectural variations in the Lasem Chinatown domiciles as compared to their traditional counterparts in China. While the quintessential Chinese housing paradigm boasts a central courtyard encircled by structures, the Lasem Chinatown residences are marked by a central architectural entity dominating the entirety of the plot. However, a semblance is observed in the survival of the courtyard feature, albeit with divergent morphological floor plans. In spite of these differences, certain commonalities, such as peripheral edifices surrounding the primary structure (whether frontally, laterally, or posteriorly), are evident. The factors precipitating these unique floor plan morphologies in the Lasem Chinese residences are postulated to be rooted in adaptive responses to local climatic and socio-cultural milieus.

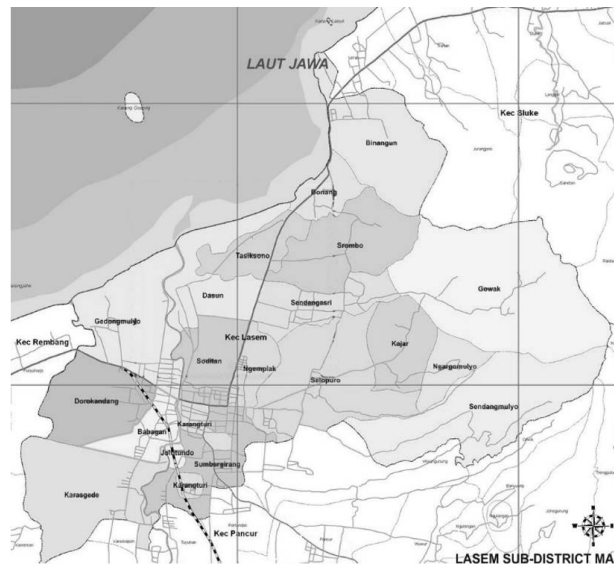


Figure 2. Map of the district of Lasem

3.2 Morphology of Lasem City

As delineated in the introductory section, Lasem's extensive chronicle encompasses several epochs of territorial dominance, ranging from the Hindu-Majapahit to the Muslim, Chinese-Muslim, Dutch colonial, Japanese, and independence eras. The nascent stage of Lasem's morphological identity is attributed to the earliest Chinese settlers who began their sojourn in Dasun. In due course, these Chinese encampments burgeoned, eventually encompassing the majority of the Lasem vicinity. An indigenous inhabitant from the Babagan area revealed, during an interview, that symbiotic coexistence between the Chinese and the native Javanese thrived, fostering mutual cultural respect. The vestiges of cultural acculturation in Lasem, dating back to the Hindu Majapahit epoch, manifest vividly in the architectural legacy of the Jami' Lasem mosque, a structure infused with both Hindu and Javanese attributes. Noteworthy is the adoption of the Indische architectural style—a Dutch architectural influence—observed in various Chinese settlements, notably in Babagan and Karangturi.

The advent of Admiral Chengho and his retinue marked a pivotal juncture in Lasem's urban fabric. Their decision to establish a residential base in Lasem birthed a linear roadway, bridging the Chinese settlement with the primary square. In the 15th century, during the Majapahit Hindu era, Dasun road was identified as the principal conduit of Chinatown in Lasem. This era witnessed an influx of Chinese travellers, drawn to Lasem due to its scenic allure and strategic geographical positioning. Maritime routes or ports served as the primary access channels. Subsequent to this, the 16th-century Chinese-Muslim era introduced an auxiliary roadway extending eastwards from the square. By the 18th century, the Dutch colonial influence was palpable, giving rise to the Soditan road branching southwards. Intriguingly, Unjiya [9] notes that shipyards persisted until the 17th century, while the 18th and 19th centuries earmarked Lasem as an iron ship production hub.

The 1840s heralded a significant infrastructural transformation with a river meander, prompting the emergence of a terrestrial pathway, superseding the riverine route. Jalan Daendels or Grote Post, a Dutch construct, was devised to facilitate connectivity with Batavia. As colonial dominance persisted, emphasis shifted to terrestrial transit avenues, culminating in the inauguration of a railway network. The ensuing road schema in the 19th century underwent expansion, intertwining primary conduits with secondary and tertiary pathways, fostering connectivity across Lasem.

Understanding the character of a city necessitates examining its typological and morphological compositions. In the 15th century, plots, particularly within Chinese enclaves, remained sparse. However, simultaneous existences of plots, harking back to the era of Mataram royalty, were noted. Plot developments, particularly in Chinese enclaves, gravitated southwards towards the Soditan road in the 16th century. In proximity to the square, additional plots were allocated for religious edifices, reflecting the Islamic influence of Lasem's regency. Consequently, residential plots were interspersed south of the square. Typically, these plots ranged between 300-2000 m². A grim event in the early 18th century witnessed the tragic extermination of approximately 10,000 Chinese individuals under Dutch directives, leading to a surge in migrants within the Soditan precinct. For many, Lasem transformed into a sanctuary, a haven safeguarding their existence.

The expansion of Chinese settlements was observed, predominantly westward, though maintaining their position along the banks of the Babagan or Lasem river. Field observations indicated that plot areas in the Babagan and Karangturi locales ranged from 300-2000 m², with Karangturi specifically averaging between 500-1000 m². By the 19th century, as settlements burgeoned in Lasem, previously unoccupied lands adjacent to the main road began to be populated. Interestingly, since the 1990s, minimal alterations have been recorded concerning the augmentation of Chinese community settlement plots. Rather, the indigenous settlements started to populate the surrounding vacant lands.

A hallmark of Chinese architectural influence from the 15th century is evident in the presence of courtyards. Buildings encapsulated these courtyards, reminiscent of traditional structures in North and South China. These structures predominantly faced south and were complemented with temples, symbolizing places of worship. Cu An Kiong, identified as the initial temple, was subsequently joined by two others. By 1588, in addition to places of worship for the Chinese community, mosques for Muslims were also established. It was noted that the positions of the wharf, square, regent's house, and Chinatown remained relatively unchanged.

In the early 18th century, indigenous settlements began to emerge around the square, maintaining a similar pattern to the 16th century. The architectural styles of Chinese settlements in Babagan and Soditan displayed remarkable similarity. With the burgeoning of these settlements, the number of temples increased. Notably, these temples' proximity to the Lasem river signifies the river's integral role in their religious activities. By the 1840s, the architectural pattern in villages like Dasun, Soditan, and Babagan showcased a unified model. The 19th century marked only a slight expansion in indigenous settlements around Karangturi. By the early 1990s, Lasem's architectural layout appeared almost complete, encompassing facilities such as schools, terminals, and offices. However, it is worth noting the absence of lodging establishments.

In the 15th century, the Babagan river, also known as the Lasem river, was pivotal to Lasem's development, with the original shipyard situated along its banks in Dasun village. The river maintained its importance into the 16th century. Yet, by the 18th century, a shift in its course resulted in substantial changes, including the migration of settlements southward. Trade routes transitioned from the river to land, incorporating train and vehicular transport.

While the Lasem river ceased its role as an official trade route, its covert utilisation in the opium trade was noted. Structures such as Lawang Ombo's house were ingeniously designed for smuggling, with concealed tunnels connecting the house to the river. The colonial era of the 1840s introduced the grid system, reflecting the evolving urban structures. The road patterns by the 19th century became increasingly systematic, forming a pronounced grid. The post-independence period of the 1990s, however, saw minimal structural alterations.

Based on the identification, the historical description of the formation of the city of Lasem can be summarized in Table 1 regarding the formation of the morphology of the city of Lasem.

Table 1. Morphological identification of the city of Lasem in several periods

No.	Period (year)	Street	Plots	Building	City Skeletons
1	Hindu Majapahit (1513)	Dasun road was formed as a road that connected the Chinese settlement to the center of government (Lasem plaza)	Chinese settlements are located around Dasun road on the side of the Lasem river	Some of the Chinese buildings formed settlements in the Dasun area, the indigenous houses around the government and the main square	You can only see the main square and a few road patterns towards Dasun (near the mouth of the Lasem river)

No.	Period (year)	Street	Plots	Building	City Skeletons
2	Muslims (1588)	A branching road was formed from Dasun to the South which would become the forerunner of Soditan Village. The plaza still exists.	Additional plots follow the road pattern that is formed	Several Chinese houses were built following plots and street patterns	The shape is almost the same as before, with the addition of a little pattern of the road
3	Chinese Muslims (1740-1745)	The development of the road to the West and its network to the South, has not yet been connected to the main plaza or to the East	Additional plots appear following the road pattern from the west to form the settlement of Babagan Village on the banks of the Lasem river	There were quite a number of Chinese buildings erected in this era as a result of the Chinese massacre in Batavia. Standing first temple in Soditan (Cu An Kiong)	The city framework is starting to form but is still not connected in the West and East
4	Dutch Colonial (1750-1941)	The Daendels road was formed which connected Anyer-Panarukan. This road also eliminated the old plaza that had existed for a long time. The road became the main access after the silting of the Lasem River occurred. Railways and shipyards were also built to support the economy	Plaza turned into a market and shops around it, the addition of plots following the pattern of the Daendels road (linear)	Chinese houses dominate the position of the Daendels road as a Chinese residential area, the orientation of the buildings which used to follow the pattern of the river has changed to follow the pattern of the main road	The City of Lasem has already formed its city framework with a grid road pattern
5	Japan (1942-1945)	Not much has changed from the previous period	Not much has changed from the previous period	Not much has changed from the previous period	Still the same
6	Independence (1945-2000)	There have been several road widenings to a width of 22-30 meters (1970-1991). In 1989 the train station was no longer functional	In this period it has been increasingly filled and has varied functions	The buildings located on the main road began to change their function as commercial places	The main highway looks widened, the city framework is still the same
7	After Independence (2000-present)	Not much has changed from the previous period. The position of the square is returned to the East of the Lasem mosque in 2022.	Not much has changed from the previous period, the plots for the alun-alun were returned to their positions like the Muslim-Chinese period but with a smaller size.	Several old buildings, especially ancient buildings, were lost or damaged due to being abandoned by their owners	Same as the previous period

Referring to Table 1 and the history of the city of Lasem, changes in the morphology of the city of Lasem in each period are depicted in Figure 3:

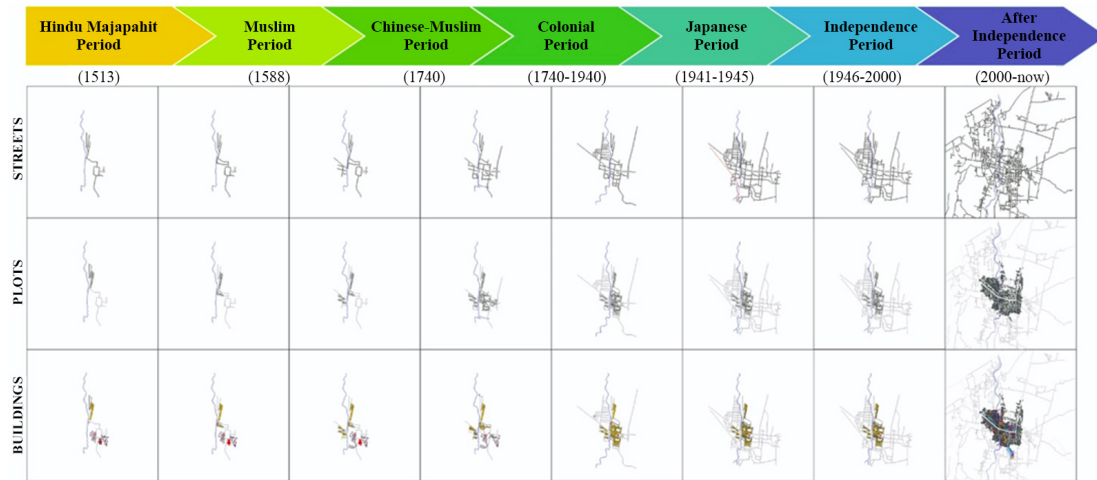


Figure 3. Changes in the morphology of the city of Lasem in several periods

4 Discussion

Urban development in Java has been observed to significantly influence city progression along its northern coast. This influence extends to the coastal city of Lasem. Cities in Indonesia have been classified into three distinct categories [10]: 1) Precolonial city (those established prior to colonial influence), 2) Colonial-era city (cities reflecting Dutch colonial legacy), and 3) Transitional to modern city (cities emerging at the dawn of Indonesian independence). On the other hand, the evolution of Indonesian cities has been categorised into four stages [11]: 1) VOC-era development, 2) City progression during the VOC era, 3) City growth in the 20th century colonialism, and 4) City development in the 1950s.

To elucidate the morphological trajectory of the coastal city of Lasem, a timeline was constructed. This timeline, derived from the classifications of city development in Java and Indonesia, has been adapted to encapsulate the seven distinct periods of Lasem's urban evolution, as grounded in its formative history. Figure 4 presents a delineated timeline charting the evolution of the coastal city of Lasem.

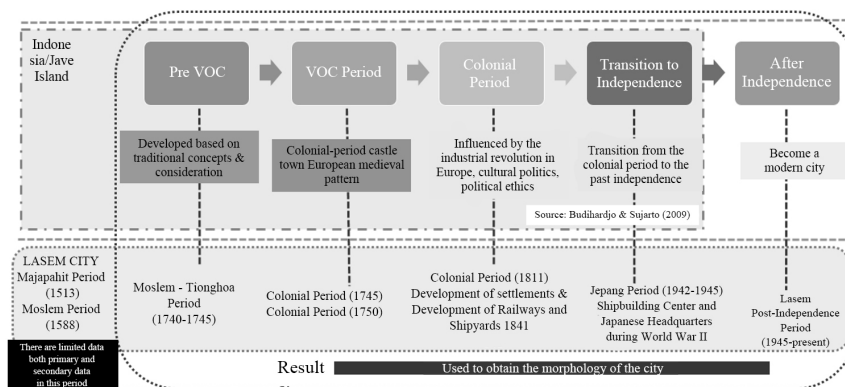


Figure 4. The development timeline of the coastal town of Lasem

Based on Figure 4, the developmental timeline of the coastal city of Lasem has been delineated as follows: 1) VOC Period (1745-1750 colonial period), 2) Colonial period (1811-1841 colonial period), 3) Transition to independence (1942-1945), and 4) Post-independence (1945-present). This timeline has been utilised to elucidate the morphological pattern of Lasem's coastal city. The morphological theory of coastal colonial cities in Southeast Asia has been adopted as a comparative reference to derive a morphological portrayal of Lasem, juxtaposing it with Widodo's theory [4].

The morphological pattern of the coastal city was found to be influenced by the influx of Chinese migrants via sea or river. The inaugural Chinese settlement was identified in the Dasun area, which subsequently expanded southward, culminating in the Babagan region.

Subsequently, the Dutch arrived in Lasem and began exerting control. Characteristics of this era include the construction of Dutch trading posts, with Chinese settlements strategically situated. The Dutch, arriving via the North coast near the port of Bandar Regol, used large ships, whereas the Chinese, predating the Dutch, accessed the area using smaller vessels via the Lasem River, leading to the establishment of the Dasun Village settlement. This Chinese settlement then expanded into the Babagan Village, proximal to the Lasem River. The Dutch trading posts were initially situated around the Dasun Village, marking the primary morphological patterns of the Lasem coastal city.

Upon establishing trading posts, the Dutch then transitioned to the Colony fortress phase [4]. During this period, instead of erecting a fort colony, the administrative epicentre, originally in Lasem, was relocated to Rembang. As a result, Lasem's administrative rank was demoted to a sub-district city, a status retained till date. This shift led to the absence of fortifications in Lasem. Additionally, the Dutch repurposed the square, transforming it into a market or trading zone.

Post-establishment of the fort colony, city fortifications were undertaken for enhanced security. The Dutch constructed fortress cities, placing Chinese settlements externally. Contrarily, Lasem lacked both a fort colony and a fortress city during this morphological phase. With the old port rendered non-functional (attributed to the silting of the Lasem River), trading was exclusively terrestrial. Concurrently, a westward shift of the third Chinese settlement, towards the Karangturi region, was observed.

When Dutch control over the city solidified, segregation of residential spaces based on ethnicity was instituted. Distinctive features included ethnically-clustered settlements. By 1835, the settlement system (*wijkenstelsel*) was implemented across Java, including Lasem [12]. Regulations mandated separate regions for foreigners and Dutch East Indies inhabitants, overseen by respective leaders. The 1850 upheaval against the Manchurian populace in China led to a significant influx of Chinese migrants to Lasem. Consequently, Chinese settlements expanded notably towards the Gedongmulyo Village. The Dutch also introduced a street pass system (*passenstelsel*) in 1863, necessitating road passes for foreigners residing in Java and Madura.

The final phase, as delineated in the morphological theory of coastal colonial cities in Southeast Asia, is the pre-modern city. Distinct characteristics encompass the establishment of modern amenities and infrastructure, accompanied by city expansion due to escalating urban population. Theory suggests pre-modern cities are identified by the presence of a Central Business District (CBD) and new urban areas, bolstered by new infrastructure and transport amenities. However, in Lasem, non-operational ports and silted rivers negated the conventional formation of the CBD. Instead, terrestrial routes and infrastructure took precedence, with the CBD emerging linearly along Jalan Daendels and Jalan Jati Rogo.

The morphological characteristics of Lasem's coastal city during its pre-modern phase exhibit deviations from Widodo's theoretical framework [4]. Notably, Lasem lacks both a fortress city and a defunct port. However, parallels can be discerned in the context of infrastructure and the introduction of novel road transportation amenities, which are well-established and facilitated. Typically, in the pre-modern urban stage, a CBD coalesces with the emergence of a new city. In the case of Lasem, the CBD evolves in tandem with the principal roadway, with economic activities expanding linearly along Jalan Daendels through to Jalan Jati Rogo.

The morphology of Lasem city is delineated by its structural configuration. From the analysis of several periodizations that trace changes in roads, plots, buildings, and urban frameworks, it has been inferred that the urban structure in Lasem is dichotomised into permanent and adaptive components. The enduring elements are identified as the primary square and the Lasem river. In contrast, the mutable structures are discerned to be Daendels' roads and the railways instituted in the colonial era (1841). It has been observed that Jalan Daendels influences the orientation of adjacent building façades [12]. Moreover, insights from Table 1 lead to the conclusion regarding the distinct identity of Lasem as a coastal city: Lasem emerged as a significant settlement for the Chinese in Java. Prior to the Dutch's ingress into Lasem, a significant Chinese population had already been established. Historical events from the 1740s (colonial period), notably the massacre of Chinese individuals in Batavia, prompted a substantial Chinese migration to Lasem, rendering it a bastion of resistance against the Dutch. Consequently, in the 1750s, the Dutch strategically shifted their regency capital to Rembang, relegating Lasem's status to that of a sub-district city. Such historical and political nuances underscore the deviations in Lasem's coastal city morphology from the general morphological theory of Southeast Asian coastal cities. Apart from the evident political manoeuvres by the Dutch, Lasem's geographical positioning within the smaller towns on Java's northern coast must be considered as a contributing factor. Hence, it is posited that the morphological model for Lasem during the Dutch colonial tenure comprises four distinct stages.

1. Before the Dutch entered Lasem (Figure 5)
2. Trading post (Figure 6)
3. Cities of segregated ethnicities (Figure 7)
4. Pre-modern city (Figure 8)

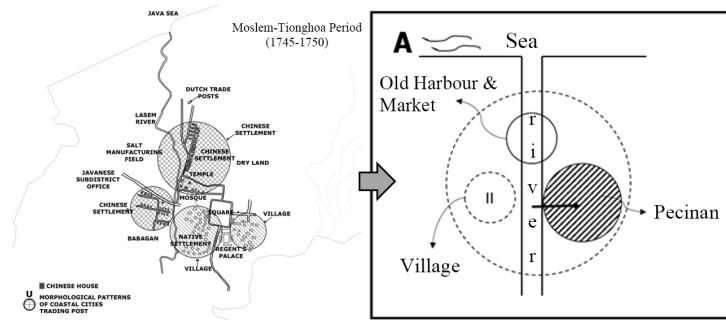


Figure 5. Morphology of the coastal city of Lasem in the first stage (before the Dutch entered Lasem)

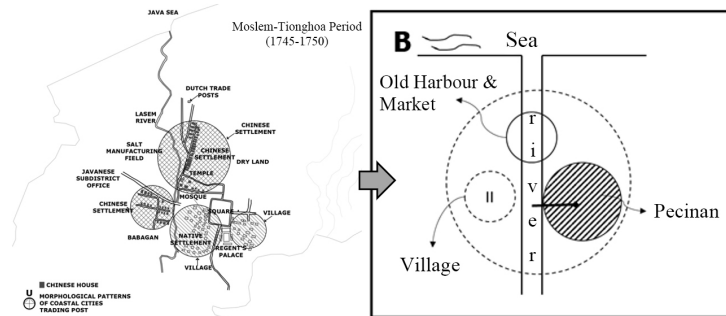


Figure 6. Morphology of the coastal city of Lasem in the second stage (trading post)

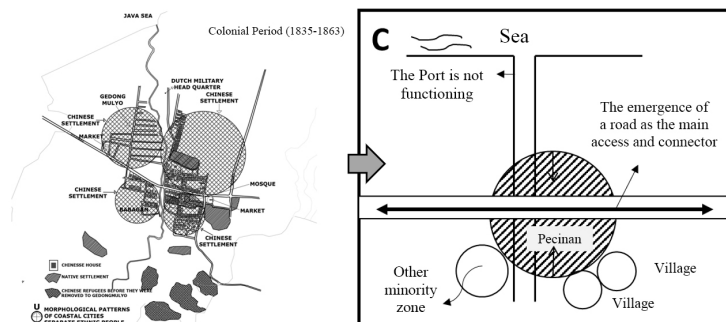


Figure 7. Morphology of the coastal city of Lasem in the third stage (segregated ethnic cities)

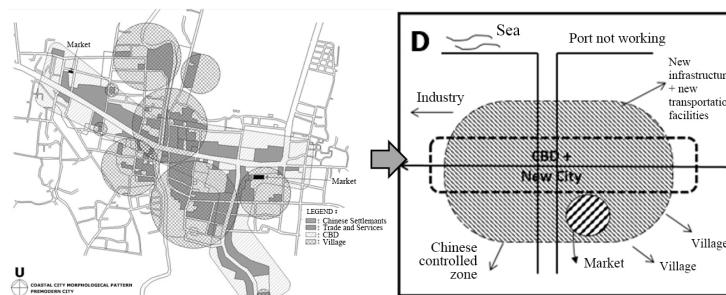


Figure 8. Morphology of the coastal city of Lasem in the fourth stage (pre-modern city)

5 Conclusions

Through the examination undertaken, it has been elucidated that the morphological attributes of the coastal city of Lasem markedly differ from those commonly observed in larger Southeast Asian coastal cities. This distinction is primarily attributed to Lasem's status as a minor coastal settlement.

Central to this study's findings are the unique physical and spatial characteristics that underscore Lasem's coastal morphology. An interdisciplinary lens encompassing geography (natural conditions and coastal city locations),

architecture (orientation of roads, plots, and structures), and history (economic shifts, political events) has been applied, furnishing a holistic comprehension of Lasem's coastal morphology. It has been discerned that when juxtaposed with other coastal cities, analogous traits in Lasem's morphological framework remain elusive. The diachronic evolution of Lasem's coastal morphology, inclusive of determinants like urban migrations (notably, the relocation of Chinese communities following pivotal events), has been charted.

Given the singular morphology of Lasem, emphasis on preservation, particularly of historical edifices, is imperative to safeguarding the city's distinctive identity in a sustainable framework. Such conservation endeavours would ideally entail collaborative undertakings between the governing bodies and proprietors of these historical sites. While this study offers invaluable insights, limitations, predominantly in the realm of data accessibility encompassing historical records and exhaustive mapping, have been acknowledged. Nevertheless, the outcomes of this research serve as a foundation for subsequent inquiries, aiming to bolster the understanding of cities' physical and spatial paradigms. The specificity of this study's focus on Lasem means its findings might not universally extend to coastal cities with variant characteristics. A seminal contribution of this research lies in shedding light on the morphology of petite coastal settlements, an area hitherto underexplored. Future research is recommended to probe further into the nexus between Lasem's coastal morphology and sectors like tourism and infrastructural development, fostering a deeper cognisance of the reverberations these activities might have on spatial planning and architectural designs.

Data Availability

Not applicable.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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