Morphological Characteristics of Rural Settlement in Rapidly Urbanising Regions: A Comparative Study of Existing Villages in the New Territories, Hong Kong

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Abstract

The unprecedented rate of urbanisation is reshaping rural landscapes across the globe, particularly in Southeast Asia. Rural settlements in these regions often become transitional zones, experiencing rapid socio-spatial transformations. The New Territories represent a unique historical and cultural landscape in Hong Kong, with rural settlements that have existed for centuries. However, the villages are now caught between traditional ways of life and the pressures of urban development. This study combines different methods to examine the morphological patterns of rural settlements in the New Territories of Hong Kong under the impact of rapid urbanisation. The findings highlight the dynamics of rural-urban integration in the New Territories, where urbanisation has reshaped settlement morphology while eroding traditional rural landscapes. This research emphasises the need for sustainable rural-urban integration that balances development with heritage preservation and ecological conservation. Beyond its focus on morphology, the study provides insights into the socio-economic and cultural impacts of urbanisation, offering policy insights for integrated urban-rural development.

Keywords

Rural settlements, Morphology, Urbanisation, Hong Kong, New Territories

1. Introduction

Urbanisation progress worldwide has led to significant changes in the interface between conventional urban and rural areas. The transitional zones reveal complex social and physical dynamics, combining migration and development alongside preservation of traditional practices and architectural heritage. Rural settlements function as critical sites to study social dynamics and spatial changes as they reveal critical insights about urbanisation effects (Huang, Xia, Chen, & Hong, J., 2024). The physical structure of rural settlements is embedded with a rich array of information, including the historical development of socio-cultural practices, economic activities, and environmental adaptation. Against this background, the New Territories of Hong Kong represent an outstanding case to research how urbanisation affects rural areas in the region, given their long-standing history and partial preservation of traditional morphological structures (Lai, 2015). Throughout the centuries, this area maintained its network of agricultural land, which supported both the Punti indigenous people and Hakka settlers. Each group has distinct settlement patterns that reflect different cultural traditions, economic systems, and relationships with environmental factors. Punti villages built their defences through walls and arranged their layout around ancestral halls, signifying the clan-based kinship system of their society. The Hakka villages occupied leftover spaces in valley regions or mountain foot areas, applying feng shui principles to maintain natural harmony according to traditional cultural norms (Merry, 2019).

Since World War II, Hong Kong has started its unprecedented urbanisation process, which has reshaped the territorial layout. Rapid population growth, along with industrial expansion and strategic government planning, has led to the rapid development of new towns in the New Territories, increasingly occupying the original rural territories (Ganesan & Lau, 2000). The conversion of agricultural land into urban zones through rezoning procedures has caused a radical change in both rural appearance and traditional villages' morphologies. The Small House Policy (SHP) implemented in 1972 enabled indigenous male villagers to construct modern standardised three-story houses, which sped up the transformation of village structure. The new building typology brought by this policy merged with existing structures to reshape village density and spatial arrangement. Rapid urban development has generated substantial strain on indigenous rural communities, which now struggle to maintain their traditional way of life within the advancing urbanisation front (Cheshmehzangi, 2016).

The study of rural settlement morphological evolution patterns, when adequately considered by planners and policymakers, may have crucial implications for urban planning, heritage protection, and sustainable rural development. From this perspective, the development process of villages in the New Territories of Hong Kong provides a valuable reference for exploring adaptation, resilience, and transformation mechanisms. Through in-depth research on the morphology of rural settlements, a better understanding of the relationship between

humans and the land can be achieved, and a scientific basis can be provided for formulating policies on rural revitalisation and integrated urban-rural development.

2. Literature Review

2.1 Rural Settlement under Global Urbanization

The worldwide growing patterns of urbanisation have reshaped rural settlements through changes in their spatial organisation, as well as in their economic and social systems. As the basic spatial units of rural geography, rural settlements determine their scale, layout and density through the combined effects of historical, cultural, natural, economic and political factors (Huang, Xia, Chen, & Hong, J., 2024). The morphological transformation of rural settlements follows distinct patterns during regional urbanisation as developed countries experience suburban settlement growth and developing nations experience both the "hollowing out" phenomenon and settlement contraction (Liu, Ou, Li, Zhang, & He, 2023).

Traditional rural settlements experience multiple disturbances during urbanisation periods (Chugunova, Polyakova, Narozhnyaya, & Lisetskii, 2023). The rural labour force migration pattern results in population reduction of central villages, while the expansion of urban centres causes suburban development in rural areas located near cities. Moreover, urbanisation processes trigger changes in rural land use patterns. The conversion of farmland into residential, industrial and infrastructure developments not only decreases valuable agricultural and ecological areas but also harms natural biodiversity and ecological systems. The expanding urban area has created transitional "peri-urban" zones by dissolving the traditional distinction between urban and rural areas (Barbosa, Pradilla, & Rajendran, 2022). These regions demonstrate diverse land use combinations together with scattered residential patterns while displaying both rural and urban attributes because of their ongoing socio-economic transformation and spatial evolution. The primary causes behind these areas developing include urban growth, as well as centrifugal movement in residential demands due to rising real estate prices in the city centre. These regions experience multiple difficulties because of inadequate infrastructure, environmental deterioration, and fragmented governance structures.

2.2 Urbanization and Its Impacts on Rural Settlements in the New Territories

Since the middle of the 20th century, the urbanisation process in Hong Kong has irreversibly reshaped the New Territories landscape. Driven by population growth and economic transformation, rural settlements and agricultural land have gradually been replaced by urban landscapes. After World War II, Hong Kong witnessed an unprecedented influx of immigrants and refugees. The population changes documented by Faure (2003) and Hayes (1993, 1996) revealed how the urban areas of Hong Kong Island and Kowloon faced extreme population pressure. This population pressure was the main driving force behind the government's

eventual decision to turn its attention to the New Territories in search of a spatial solution. At the same time, Hong Kong started its early industrialisation. The light industry experienced rapid growth during the 1950s and 1960s because of an abundant labour force and the government's laissez-faire policy (Lui and Chiu, 1994). The initial industrial operations took place in old urban districts, but the expanding need for industrial facilities and workers led to their spread. The initial lack of plans for large-scale industrial activities in the New Territories did not stop the industrial development momentum, which created employment opportunities that drew rural residents to leave their agricultural work, thus starting the decline of the New Territories' agricultural economy (Smart & Smart, 2003).

The fast population expansion and the housing crisis forced the colonial government to implement stronger urban development policies. Bristow (1984, 1989) provided a comprehensive analysis of the evolution of Hong Kong's planning policies, highlighting the shift towards the concept of new towns. The new town development program started its official operation during the early 1970s to decentralise population while building self-contained communities in the New Territories. The new towns function beyond their role as residential areas because they contain their own employment centres, together with commercial facilities and social services. The construction of new towns requires extensive land reclamation projects and forced relocation of local villages, which transforms both the natural environment and social communities of the New Territories. Although the program succeeded in housing millions of people, it also caused the disappearance of traditional rural landscapes together with their associated lifestyles.

In order to contain the shrinkage of the rural population, local policymakers developed ad hoc policies. Introduced in 1972, the SHP is one of the most significant and controversial policies affecting rural settlements in the New Territories (Hase, 2008). The policy grants male indigenous villagers the right to build a small house (typically three stories, 700 sq ft per floor) within their ancestral village environs, often on concessionary land grants or through free building licenses on their own agricultural land. The stated aims were to improve rural housing conditions and allow indigenous communities to maintain their traditions. However, the SHP has had profound and often criticised consequences. Yeung (2003) and more recent critiques by environmental groups (e.g., Liber Research Community) highlighted how the SHP has led to the haphazard transformation of traditional village layouts into dense, poorly planned collections of "Ding houses".

The economic transformation of Hong Kong from manufacturing to services and logistics during the 1980s and 1990s created new land use demands throughout the New Territories. The northern and northwestern New Territories experienced rapid growth of *open storage* functional areas, locally known as *brownfields*, which included container yards, vehicle repair workshops, recycling depots, and construction material storage facilities. The economic

logic behind these activities makes them suitable for former agricultural land, yet they create environmental problems in a region with high land values and weak regulatory oversight. The brownfield sites produce a series of externalities, including negative visual impact, pollution, and noise disturbances, which harm local ecosystems and drainage systems, further degrading the rural landscape of affected areas.

3. Materials and Methods

3.1 Research Design

This research employs a multi-method approach comprising comparative spatial analysis of the rural settlement morphology for the three types of villages in the New Territories, Hong Kong. The study was carried out in three levels: (1) macro level, (2) meso level, and (3) micro level. At the macro level, kernel density analysis was utilised to illustrate the distribution density of rural settlements in the study area. At the meso level, different spatial metrics were examined to reflect settlement spatial characteristics by quantitative indices. At the micro level, a longitudinal comparative analysis of three typical cases was conducted, using aerial photographs from 1945 to 2023 to analyse landscape transformation under rapid urbanisation in the New Territories.

3.2 Study Area and Study Groups

As one of the most densely inhabited and highly urbanised regions in the world, Hong Kong has been discussed as a living archive of urban development. The New Territories, which occupy 88% of Hong Kong's land with a total area of 975.23 square kilometres, were the vastest rural area in Hong Kong and almost totally occupied by the traditional Southeast Asian agricultural landscape. Today, it has been left under 'unplanned, disorderly and piecemeal development' (Jim, 1997), facing challenges in rural-urban transformation during rapid urbanisation processes.

According to the Hong Kong Rural Representative Election 2023-2026, there are now 695 existing villages in the New Territories. In this study, these villages are categorised into three different groups (Figure 1), namely pre-1898 villages, post-1989 villages and composite villages, based on the different times of establishment. Pre-1898 villages refer to the villages which existed in 1898 (574 existing pre-1898 villages in 2023). Post-1898 villages refer to the villages which were established after 1898 (106 existing post-1898 villages in 2023). Composite villages are those composed of post-1898 villages with relatively small populations (15 existing composite villages in 2023).

3.3 Data Sources and Preparation

The geographic data of the existing village boundaries was collected from DATA.GOV.HK, provided by the Hong Kong Home Affairs Department. The geographic information data were imported into QGIS 3.34.14 and AutoCAD 2020 software for further data analysis. The longitudinal imagery data from 1945 to 2023 were acquired from the aerial photo database and True Digital Orthophoto (TDOP) Series from the Survey and Mapping Office,

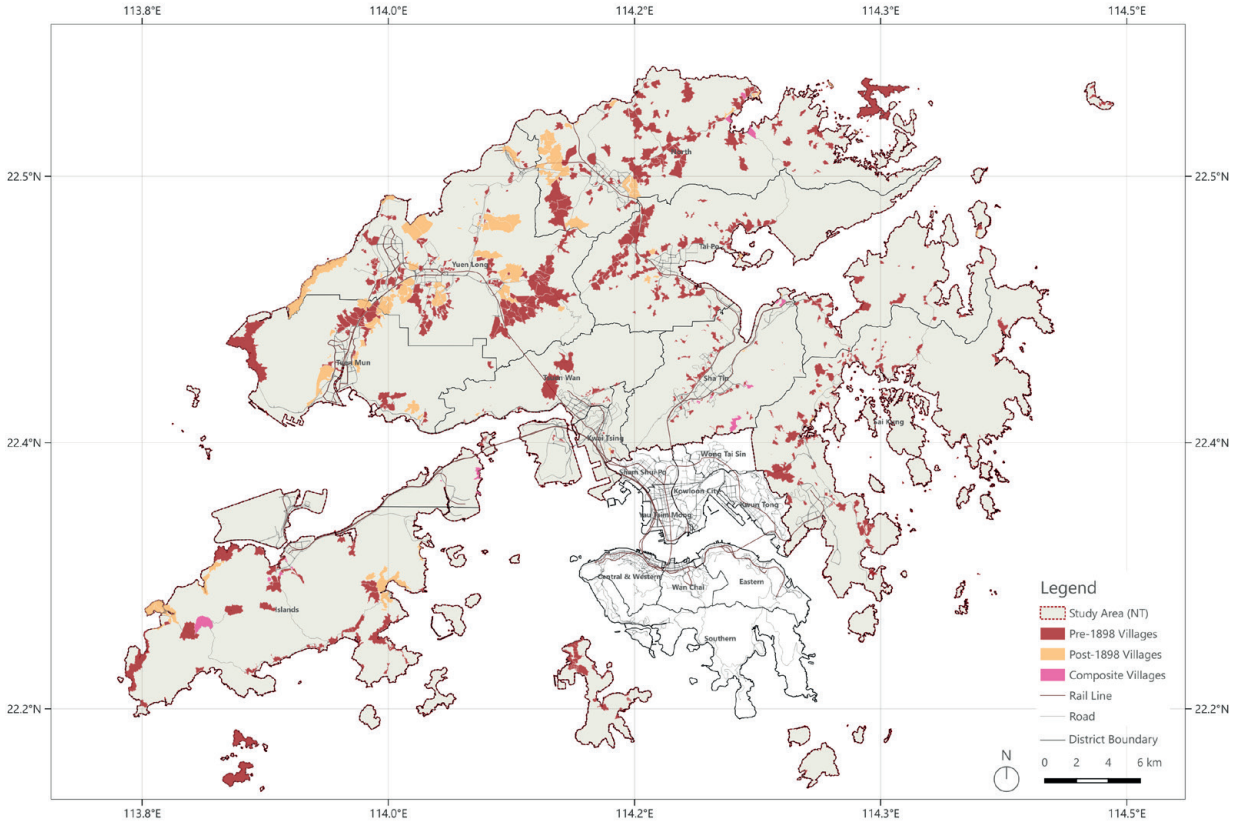

Figure 1. Distribution of pre-1898 villages, post-1898 villages and composite villages in the New Territories, 2023.

Lands Department of Hong Kong. According to the Survey and Mapping Office, the aerial photographs were periodically captured at various altitudes with heights ranging from 2000 ft to 12500 ft; most photographs were shot between 4000 ft and 8000 ft. To enhance accuracy, there was a preference in this study for collecting aerial photographs that shared the same capture height, resolution, and were taken during the same month or season, whenever such options were accessible. Aerial photographs of various resolutions and from different heights were employed according to availability. The aerial imagery data were input to QGIS 3.34.14 software for mosaicking and georeferencing. Google Earth and Google Street View were included in the validation.

3.4 Data Interpretation and Analysis

3.4.1 Kernel Density Analysis

This method first builds a smooth circular surface for each data point in an assigned region and calculates the distance from each point to a reference position and the sum of all distance values, finally constructing a continuous surface of all data points. It is now widely used in urban planning and settlement analysis to identify and analyse the distribution of spatial data. In this study, this approach was utilised to determine the distribution density of different groups of existing villages in the study area, to explore the spatial distribution characteristics of rural settlements. The higher the kernel density value, the greater the distribution density.

3.4.2 Spatial Metrics Analysis

Spatial metrics are quantitative indices that can reflect various information on a landscape, such as structure composition and spatial configuration (Wu, Shen, Sun, & Tueller, 2002). In this research, the boundary of each existing village was used as the basic patch unit for analysis. The spatial metrics index was characterised by

Index	Abbreviation	Formula	Description
Total patch area	TA	$TA = \sum_{i=1}^{n} a_i$	The total area of the rural settlements in a given area. a_i is the area of the area of rural settlement, $TA \geq 0$.
Mean patch size	MPS	$MPS = \frac{TA}{n_i}$	The average size of the rural settlements in a given area. TA is the total area of rural settlements in a given region, n_i is the total number of rural settlements.
Patch size standard deviation	PSSD	$PSSD = \sqrt{\frac{\sum_{i=1}^{m}\sum_{j=1}^{n}\left[a_{ij} - \left(\frac{TA}{N}\right)\right]^2}{N}}$	The relative size of rural settlements in a region. a_{ij} is the area of rural settlement, TA is the total area of the rural settlement, and N is the total number of rural settlements, when there is only one settlement patch, $PSSD = 0$
Mean nearest neighbor distance	MNND	$MNND = \sum_{i=1}^{n} \frac{d_i}{n}$	The average distance between the centroid of each rural settlement and the nearest neighbor. d_i is the distance between each element and its nearest element

Table 1. The index of spatial metrics.

total patch area (TA), mean patch size (MPS), patch size standard deviation (PSSD), and mean nearest neighbour distance (MNND) to analyse the spatial pattern of rural settlement in the New Territories (Table 1). Among these indicators, TA can be used to present the overall spatial characteristics of a certain type of rural settlement within a region. MPS is employed to reflect the average state and landscape fragmentation of rural settlements. A settlement type with a smaller MPS value is more fragmented than one with a larger value. PSSD was used to express greater size differences among rural settlements within a region. MNND was employed to measure the state spatial aggregation.

3.4.3 Longitudinal Pattern Analysis

As illustrated in Figure 2, this study selected three typical villages of each type of rural settlement as the study cases: (a) Pre-1898 Villages: Sheung Shui Heung), (b) Post-1898 Villages: Tong Yan San Tsuen, and (c) Composite Villages: Wu Kai Sha and Cheung Kang for a comparative landscape transformation analysis. Then twelve categories of landscapes were identified based on the literature review and preliminary fieldwork: (1) agricultural land, (2) vegetation, (3)

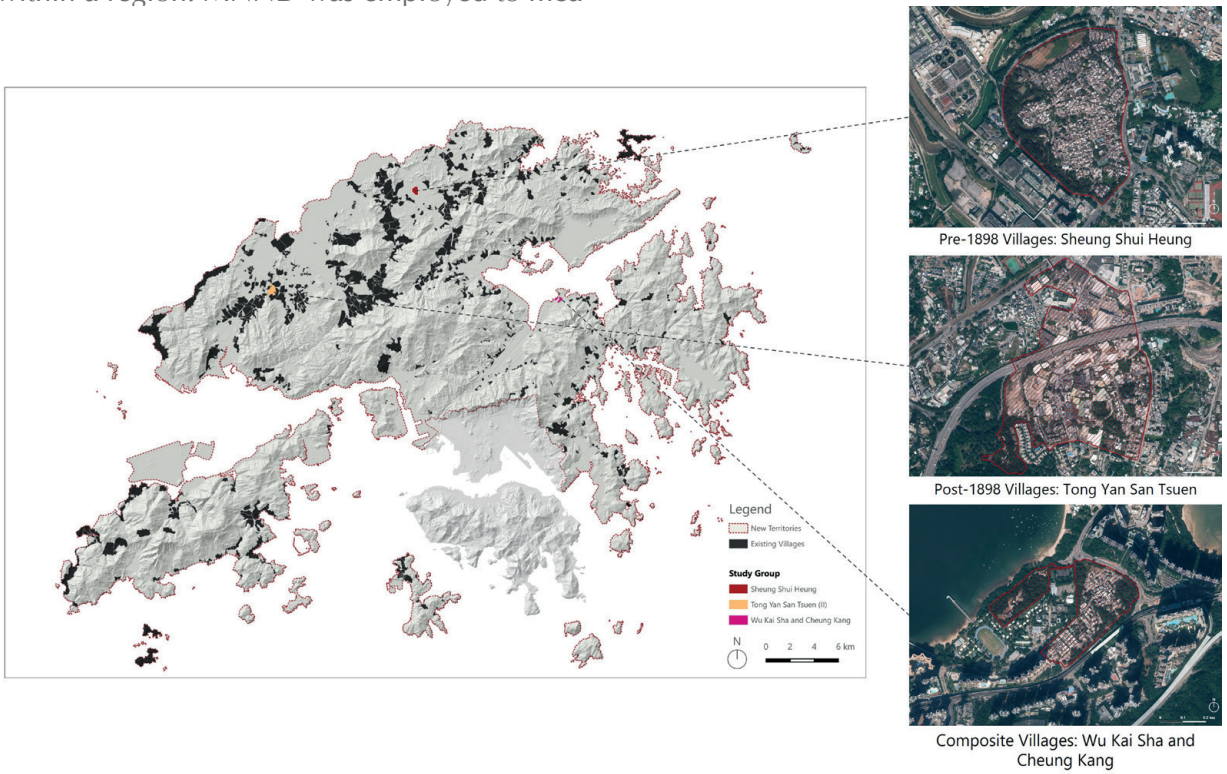

Figure 2. Location map of study cases of landscape transformation analysis.

Categories	Description	Landscape characteristics
Agricultural land	Cultivated land and aquacultural land	
Vegetation	Underdeveloped green areas and street planting	
Waterbody	River, channel	
Transportation	Road, railway	
Car park	Formal and informal parking lots	
Brownfield	Open storage, container yard and workshop	
Factory	Large scale private factories	
Unclassified	Wasteland and vacant space	
Rural dwelling	Traditional rural houses	
Small house	Houses built under the Small House Policy	
Urban dwelling	Apartments, villas and other urban facilities	
Public space	Playgrounds and parks	

Table 2. Categorisation of rural settlement landscapes.

waterbody, (4) transportation, (5) car park, (6) brownfield, (7) factory, (8) unclassified (9) rural dwelling, (10) small house, (11) urban dwelling, and (12) public space, as displayed in Table 2. All the landscape was visually recognised and manually interpreted based on the aerial photographs of the study cases from 1945 to 2023. The imagery data was then further measured and calculated for the spatial and statistical analysis.

4. Results

4.1 Rural Settlement Distribution Patterns

By utilising the Kernel Density Analysis tool, the spatial distribution density map (Figure 3) of the rural settlements in the New Territories was obtained. In the figure, a deeper colour represents a higher density of settlement in the corresponding region. The results showed that the highest kernel density values of pre-1898 villages, post-1898 villages, and composite villages were 42.18, 13.5, and 3.87/km², respectively, which indicated that the pre-1898 villages had the strongest spatial agglomeration characteristics, while the composite villages were usually the most scattered in distribution. Major clusters of pre-1898 villages occurred in the northwestern and northern New Territories, especially the areas near rivers, large flat plains, and valleys. These areas had a common characteristic of easy access to natural resources (water, fertile land), indicating a historical preference for strategically advantageous locations of these settlements.

In contrast, post-1898 villages showed a more dispersed spatial distribution. Higher-density areas were mainly concentrated in the northwestern New Territories, while two distinct clusters were displayed in the coastal areas of the southwestern and eastern parts of the New Territories. The composite villages showed a more scattered distribution pattern than the other two types of settlement, typically appearing as isolated villages and located in the remote areas of the New Territories. Only one clear cluster occurred in Sha Tin.

4.2 Rural Settlement Spatial Characteristics

TA values reflect the overall spatial extent of rural settlements. Figure 4 shows that the TA values

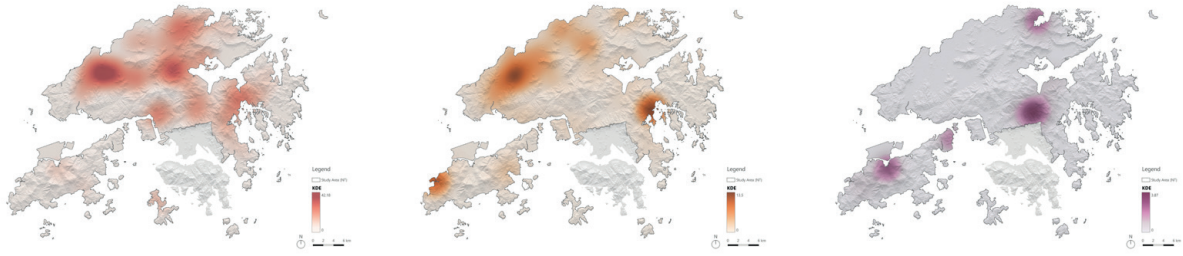

Figure 3. Spatial distribution (density) of pre-1898 villages, post-1898 villages and composite villages in the New Territories, 2023.

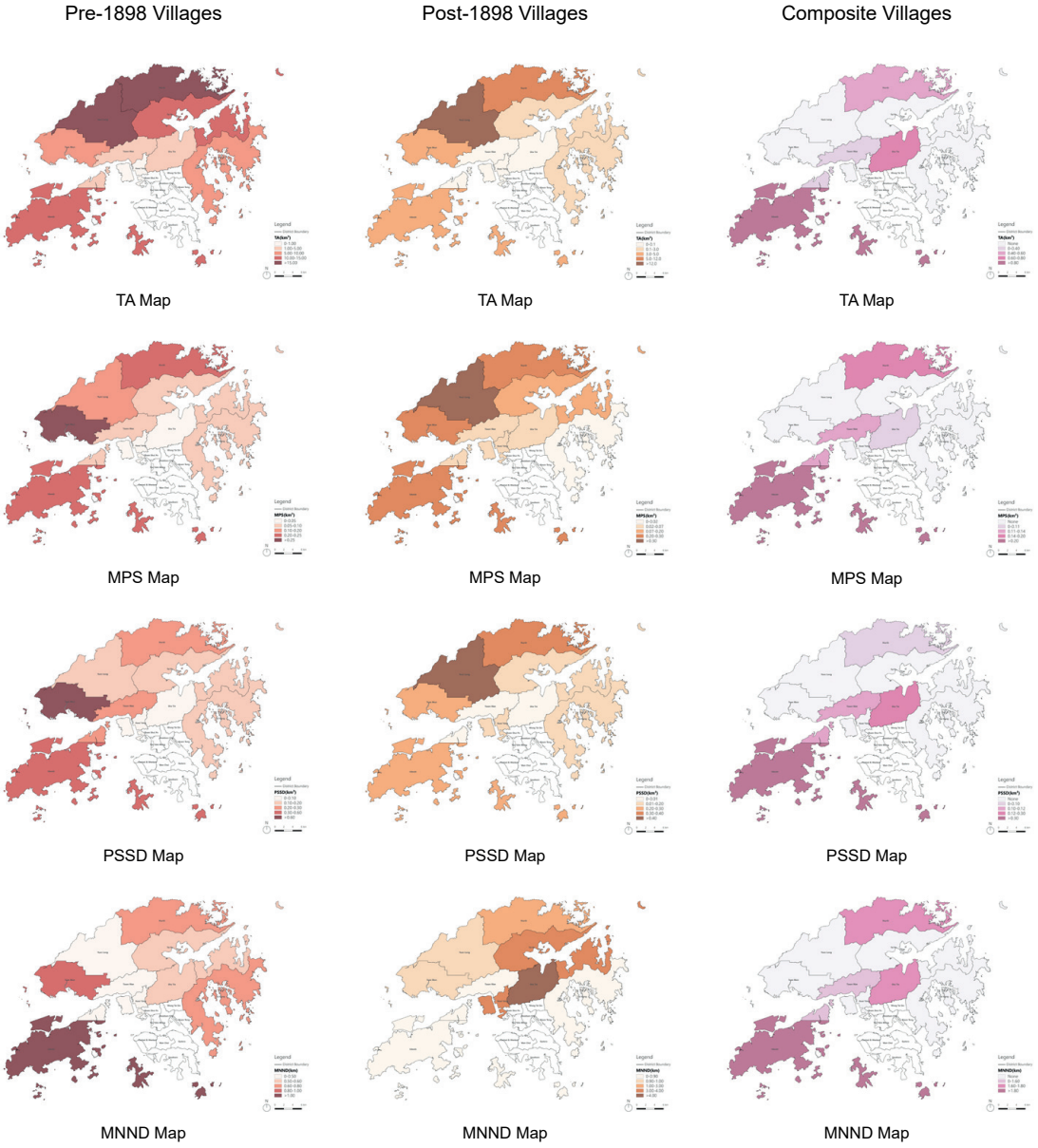

Figure 4. District-related spatial characteristics of pre-1898 villages, post-1898 villages and composite villages in the New Territories, 2023.

TA values reflect the overall spatial extent of rural settlements. Figure 4 shows that the TA values of pre-1898 villages were significantly higher than those of other types, with settlements covering large areas, especially in the North (18.97 km²), Islands (13.54 km²) and Yuen Long (15.43 km²). In contrast, the TA values of post-1898 villages were significantly lower, with North (5.39 km²) and Yuen Long (12.77 km²) remaining the main distribution areas. The TA values of composite villages were the lowest overall, with only a few areas, such as Islands (0.88 km²) and North (0.43 km²). This type of rural settlement was completely absent in areas such as Kwai Tsing, Sha Tin, Sai Kung and Yuen Long. PSSD values reflect the diversity in rural settlement size. The PSSD values of pre-1898 villages in Tuen Mun (0.62 km²) were significantly higher than those in other areas, indicating a greater disparity in settlement size. In Kwai Tsing (0.01 km²) and Sha Tin (0.04 km²), the PSSD values were relatively low, suggesting a more uniform settlement size. The PSSD values of post-1898 villages were generally low, with only a certain degree of variation in Yuen Long (0.40 km²). Figure 4 indicates that composite villages tended to have limited diversity in settlement size, with only a slightly higher PSSD value in Islands

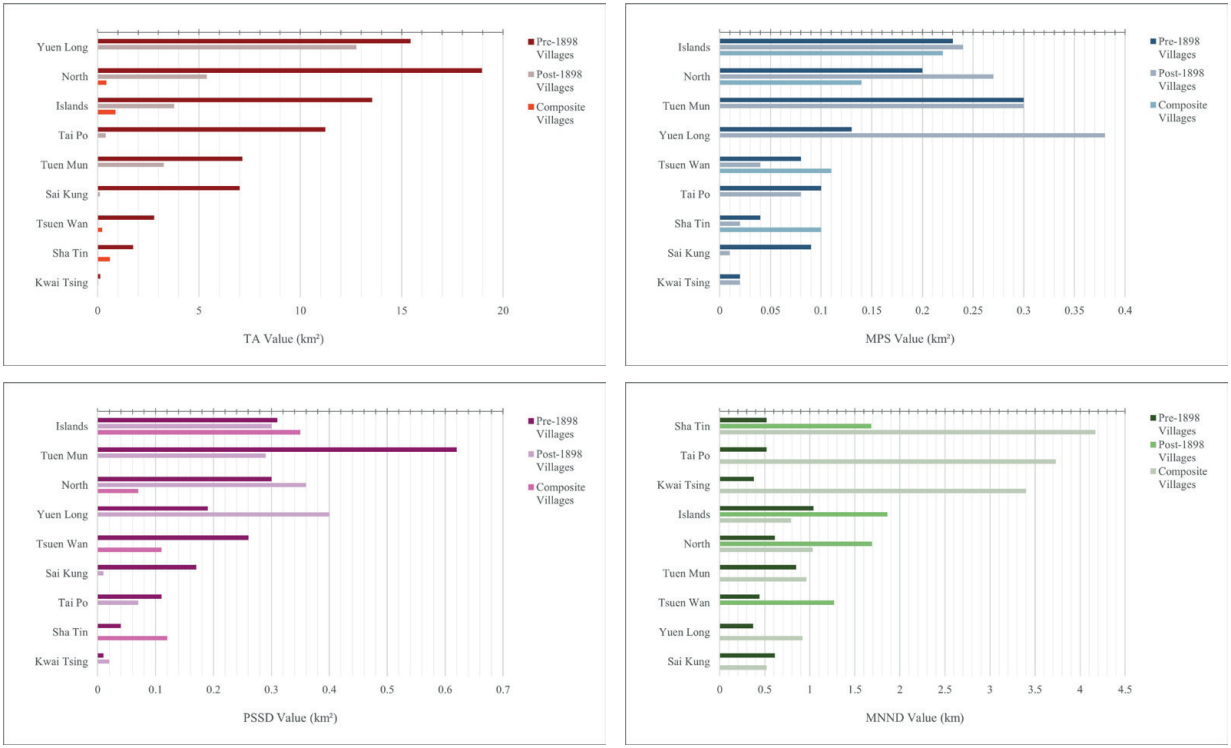

Figure 5. Rural settlement spatial characteristics in different districts in the New Territories, 2023.

(0.35 km²). MNND values are used to measure the spatial agglomeration degree of rural settlements. The MNND values of pre-1898 villages were generally low, such as in Yuen Long (0.37 km) and Tsuen Wan (0.44 km), indicating a high degree of spatial agglomeration. Only in Islands (1.04 km) was there a significant difference. In contrast, the MNND values of post-1898 villages increased significantly, such as in Sha Tin (4.17 km) and Kwai Tsing (3.40 km), suggesting a more dispersed distribution of rural settlements. The MNND values of composite villages were usually higher, such as in Islands (1.86 km) and North (1.69 km), indicating that such villages presented a pattern of low spatial agglomeration and dispersion.

From Figure 5, it can be concluded that the evolution paths of rural settlement spatial characteristics vary across different regions. In areas such as Islands, North, and Yuen Long, pre-1898 villages were generally large in scale (high TA, MPS), with moderate internal size variation (medium PSSD) and spatially concentrated (low MNND). However, post-1898 villages in these regions tended to be smaller and more dispersed (low TA, MPS, high MNND). In contrast, rural settlements in Kwai Tsing and Sha Tin have always been small in scale and highly fragmented (low TA, MPS) regardless of the type of village. The spatial influence of composite villages was very limited, with small patch sizes, high fragmentation, and a lack of spatial concentration. They were even absent in areas such as Kwai Tsing, Sai Kung, and Yuen Long. From a temporal perspective, it can be concluded that villages established before 1898 typically presented large-scale, relatively complete, and concentrated spatial characteristics, while after 1898, villages began to transform into smaller, more fragmented, and more dispersed modern settlement patterns.

4.3 Rural Settlement Landscape Transformation

The longitudinal spatial analysis results in Figure 6 revealed that the three types of rural settlements each had unique landscape evolution paths. Detailed information on land ratio changes in Figure 7 shows that pre-1898 villages (i.e., Sheung Shui Heung) were dominated by rural-oriented landscapes in 1945, with 'agricultural land' accounting for 59.41% and 'rural dwelling' for 23.08%. After 1972, 'small house' began to emerge and rapidly increased to 21.05% in 1982. Although 'agricultural land' was still the most important type of land in 1982 (39.76%), it decreased sharply over the next 15 years to 0.38% (in 1997). By 2023, 'agricultural land' had disappeared entirely, and 'small house' became the dominant landscape, accounting for 40.38%, reflecting a clear urbanisation feature. Post-1898 village (i.e., Tong Yan San Tsuen (II)) showed a more rapid trend towards industrialisation during the evolution. In 1945, 'agricultural land' accounted for 66.10%, but by 1982 it had rapidly declined to 11.43%, while 'factory' and 'brownfield' emerged, accounting for 13.04%. By 2023, rural-oriented landscapes had completely disappeared, replaced by 'urban dwelling' (27.37%) and significant industrial land ('factory' and 'brownfield' together for 43.27%). Figure 7 also illustrates

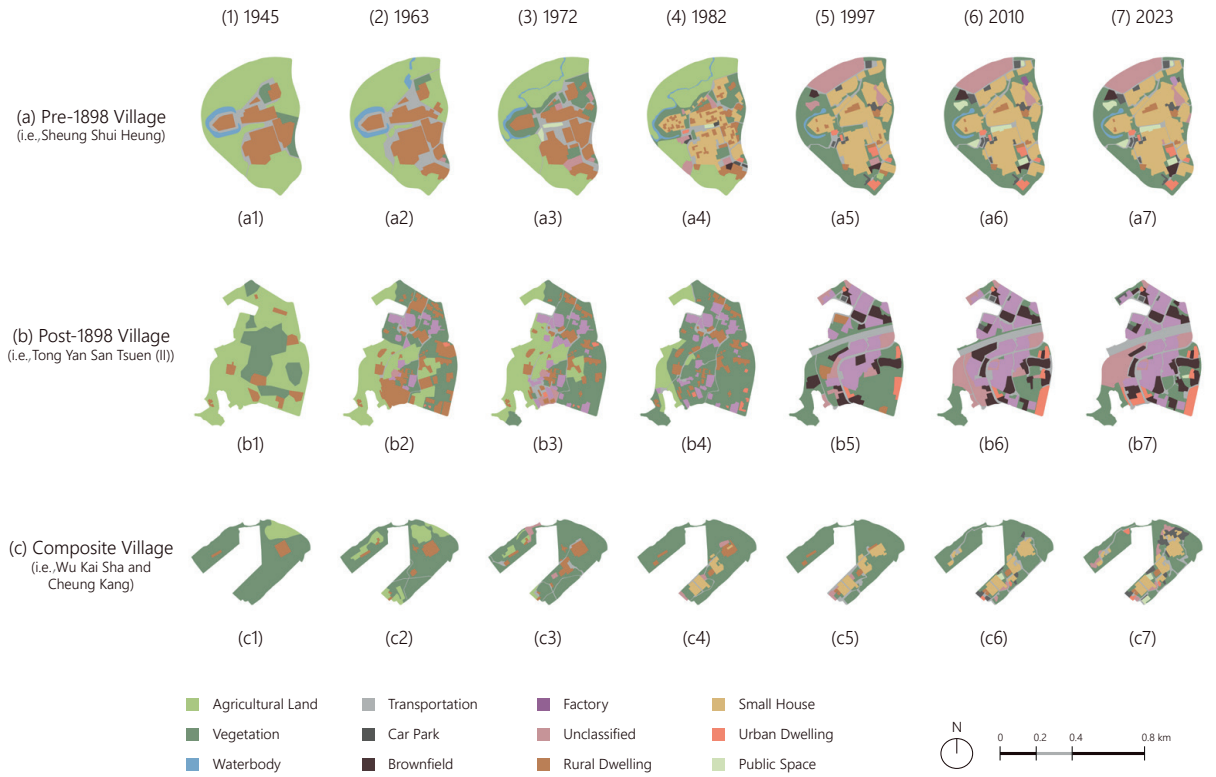

Figure 6. Rural settlement landscape transformation patterns in 1945-2023
(a) pre-1898 village (i.e., Sheung Shui Heung), (b) post-1898 village (i.e., Tong Yan San Tsuen (II)) and (c) composite village (i.e., Wu Kai Sha and Cheung Kang).

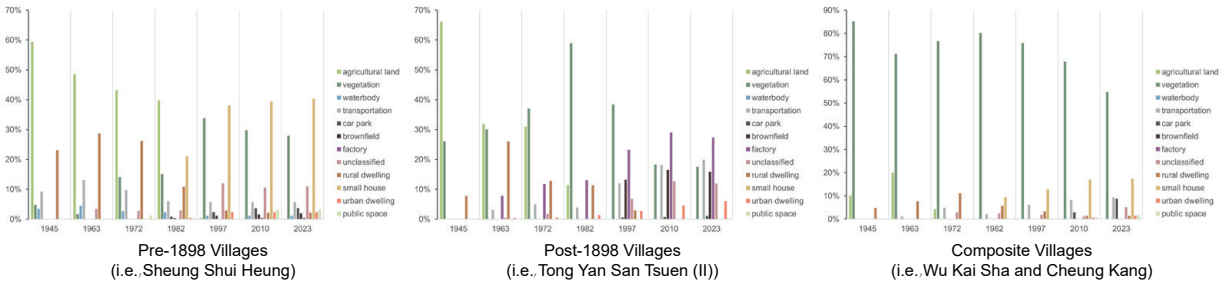

Figure 7 . Land proportion of pre-1898 village (i.e., Sheung Shui Heung), post-1898 village (i.e., Tong Yan San Tsuen (II)) and composite village (i.e., Wu Kai Sha and Cheung Kang), 1945-2023.

that the composite village (i.e., Wu Kai Sha and Cheung Kang) showed a relatively slower process of landscape transformation and a trend towards mixed-use development. In 1945, 'vegetation' accounted for 85.16% and 'agricultural land' only for 10.08%. Between 1945 and 1963, rural-oriented landscapes steadily increased to 27.63% (in 1963), but then continued to decline. A steady increase in 'transportation' and 'car park' can be observed during the transformation; these two landscapes accounted for 9.33% and 8.78% respectively in 2023. Although the 'vegetation' decreased to 54.78% in 2023, it remained the dominant landscape type, while 'rural dwelling', 'small house', 'urban dwelling', and 'public space' accounted for 1.46%, 17.40%, 1.43% and 1.77% respectively.

5. Discussion

5.1 Rural Settlement Morphological Transformation under Rapid Urbanization

The observed morphological patterns and evolution of rural settlement in this study are the direct manifestations of the intense and multifaceted urbanisation process in the New Territories since the mid-20th century. The spatial clustering pattern of pre-1898 villages in large plains (Figure 3) aligns with historical accounts of Punti settlement strategies focused on fertile agricultural land and defensible locations (Hayes, 1983; Baker, 1966). The high TA and MPS values of these settlements reflect the land control and socio-political organisation of dominant clans in the New Territories, such as the "Five Great Clans" (Faure, 1986; Baker, 1968). The following fragmentation and landscape transformation of these settlements, particularly encroached by the SHP (Figures 6 and 7), strongly proved the significant impact of government policies during the urbanisation process. As Yeung (2003) and the Liber Research Community critiqued, this policy, intended to improve rural housing, actually broke the historical spatial logic and reshaped the traditional rural settlement morphology into dense and disorderly collections of standardised structures.

The more dispersed distribution and often smaller scale of post-1898 villages (Figures 3 and 5) can be interpreted as a consequence of later establishment on hillier terrains and coastal areas, mainly by the Hakka or newer immigrant groups. These settlements usually show different transformation paths, as the industrialisation seen in Tong Yan San Tsuen (II) (Figures 6 and 7) reflects the New Territories' evolving economic role. The shift from agriculture to brownfields in these settlements is an indicator of land speculation, the demands of a changing economy from manufacturing to logistics and services (Smart & Smart, 2003). The weak initial planning controls in these zones lead to the "open storage" phenomenon discussed in the literature (Planning Department studies). This aligns with Jim's (1997) characterisation of development in the New Territories as often "unplanned, disorderly and piecemeal".

Composite villages, with highly scattered distribution and often remote locations (Figures 3 and 5), represent a more marginal form of rural settlement. These settlements show a slower

landscape transformation process (Figures 6 and 7), with a significant retention of vegetation and a mixed-use development trend in the case study. This might be impacted by a combination of factors: later or less intense development pressures, topographical constraints, or perhaps different land ownership structures. However, the encroachment of 'small houses' and infrastructure in these rural settlements indicates that no area is entirely immune to urbanising influences.

5.2 Implications for Sustainable Rural-Urban Integration

Different types of villages have followed unique paths of development, which shows that a single policy solution will not work effectively. The pre-1898 villages possess valuable historical and cultural heritage, which demands careful planning to achieve a balance between preservation and the acceptable housing requirements of indigenous populations. The current self-oriented housing program model should be evaluated for alternative approaches that could improve spatial efficiency and cultural compatibility. The post-1898 villages require specific remediation and regularisation approaches to develop coordinated land use frameworks that will reduce environmental risks and create maximum economic value. The gradual transformation of composite villages could serve as an opportunity to defend sustainable rural ways of life actively. The overall challenge is to move beyond a passive mode of development towards a more integrated and strategic vision for the New Territories that values its remaining rural character, ecological functions, and cultural heritage alongside meeting development needs. This requires a more nuanced understanding of the human-land relationship, as advocated in the significance of this research, and a stronger commitment to policies that foster rural revitalisation and integrated urban-rural development, rather than simple urban encroachment.

6. Conclusion

This study has investigated the morphological evolution of rural settlements in the New Territories of Hong Kong under rapid urbanisation, focusing on pre-1898 villages, post-1898 villages, and composite villages. This research combines historical context with detailed spatial analysis and longitudinal landscape studies to reveal essential knowledge about urbanisation's impacts on rural landscapes and settlement morphologies.

The spatial and morphological characteristics of pre-1898 villages demonstrate historical agglomeration patterns with higher density, while post-1898 villages and composite villages show more dispersed and fragmented settlement patterns. The kernel density analysis and spatial metrics showed that traditional rural settlement patterns shifted from larger and more concentrated forms to smaller and more scattered modern patterns. The research also shows that rapid urbanisation has led to major deterioration of rural-oriented landscapes, including agricultural land and rural dwellings, across all village types. Conversely, urban-oriented landscapes, notably detached houses resulting from the SHP, urban dwellings, infrastructure,

and brownfields, have significantly increased. The main drivers behind these transformations include continuous population expansion, together with strategic new town development, the SHP, and general economic changes that modified land-use requirements. The combination of these factors has produced a profound transformation of rural settlement form and operational characteristics in the New Territories.

The research provides a deeper understanding of rural-urban transformation, particularly in high-density, rapidly developing areas. The New Territories offer essential research material because they demonstrate how historical settlement patterns interact with rapid urbanisation while highlighting the difficulties of achieving a rural-urban development balance. Nevertheless, this study is not free from limitations. The longitudinal analysis of three case study villages enables researchers to identify patterns, but the findings may not be representative of all existing villages. The village categorisation represents an analytical reduction of the actual complex village reality. The research focuses primarily on physical morphology; thus, additional investigation of associated socio-economic dynamics would offer further insights into such a complex territorial transformation.

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