



Reading the Morphogenesis of Late Qing Canton Prefecture Villages Through the *Guangdong Atlas*

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Abstract. The *Guangdong Atlas*, compiled in 1866, recorded information about villages in a relatively detailed and precise manner. This paper examines the Atlas's survey of Canton Prefecture, which was the political and cultural center of the province, and the only prefecture that was scientifically surveyed during the Atlas compilation. Meanwhile, both Hong Kong and Macau at the time belonged to Canton Prefecture. The *Guangdong Atlas*, together with the *Annotations for the Guangdong Atlas* (published four years later) provide precious materials for the study of the morphogenesis of villages in Canton Prefecture at that time.

Interpreting the *Guangdong Atlas* can help us to develop a better knowledge about villages in the late Qing Dynasty from a historical geography perspective. This paper observes the spatial distributions of villages and their relationships with the mountains, waterways, walled cities, rural markets, and *xun* (garrisons). It attempts to explore the morphogenesis of villages in Canton Prefecture, and examines the social and morphological mechanisms that shaped village clusters.

Mountains, waters, and cities were the key factors that affected the distribution of villages, respectively connecting the village groups around hillsides, riversides, and suburban areas. Rural markets and *xun* were interwoven into the rural network, becoming important nodes in the landscape as well as rural life.

The information given in the *Guangdong Atlas* and its *Annotation* express the attitudes that the map-makers had toward various places. These map-makers intentionally ignored settlements in the sand field areas.

Keywords: Village · Morphogenesis · Guangdong Atlas

1 Introduction

Since the beginning of the 20th century, great changes have taken place in rural China due to wars, natural disasters, political movements, adjustments of administrative divisions, urban sprawl, and large-scale construction activities. Researchers investigating the geographical distribution of villages and the main factors affecting local development in certain regions prior to the 20th century often encounter difficulties due to the lack of reliable, systematic historical materials. In most cases, villages were not recorded on the maps of local gazetteers. Those maps were mainly focused on elements such as

mountains, rivers, walled cities, landmarks, and administrative units above the village level. Therefore, research on traditional villages has relied heavily on unofficial local literature and fieldwork. Without relatively authentic and detailed maps, researchers have been unable to develop an accurate overall comprehension of the village-level situations in specific regions.

The *Guangdong Atlas* 广东图 [1], engraved in 1866, records information about villages in a relatively detailed and precise manner. This atlas offers a wealth of evidence for studies regarding the overall distribution of villages in Guangdong Province during the late Qing Dynasty. However, so far researchers on traditional villages have gained little benefit from the increased availability of the *Guangdong Atlas*. In considering the strong regionality of traditional villages, this paper focuses on Canton Prefecture 广州府, which is the political and cultural center of the province, and the only prefecture that was scientifically surveyed by the map-makers during the *Atlas*'s compilation. Cantonese-speaking lineage villages dominated the prefecture, with many Hakka 客家 villages in the mountainous areas, and Tanka 疍家 villages located on waterways. The *Guangdong Atlas*, together with *The Annotations for the Guangdong Atlas* 广东图说 [2] (which was engraved four years later)¹ have provided precious materials for studies on the quantity, distribution, and main situational factors affecting villages in Canton Prefecture at that time.

This paper explores the village system of late-Qing rural China by reading the *Guangdong Atlas*. It investigates the relationships between the villages and their main influencing factors, such as natural conditions, rural markets, political power centers, and military installations. The paper also interprets the *Atlas*'s clues as to how the village clusters were shaped. The word “morphogenesis” is borrowed from embryology, as a term to describe the development of village clusters across the landscape. The findings offer a basis for understanding today's Pearl River Delta [3] and the Guangdong-Hong Kong-Macau Greater Bay Area.

The information given in the maps expresses the map-makers' knowledge and attitudes toward the various recorded places. All of the objects on the maps analyzed in this paper, such as the locations of settlements and institutions, the contours of mountains, or the widths and routes of rivers and roads, are based on the original information given in the *Guangdong Atlas*, without adjustments to match with contemporary data.

2 Tongzhi *Guangdong Atlas*

In 1864, the third year of the imperial order of Tongzhi 同治, local governors invited the scholar Chen Li 陈澧 (1810–1882) and the scientist Zou Boqi 邹伯奇 (1819–1869)

¹ It is easy to confuse the *Guangdong Atlas* with the *Annotation of the Guangdong Atlas*. In fact, the contents of the *Qing Dynasty Atlas Assembly*, which includes *Annotation of the Guangdong Atlas* (as published by the Xi'an Map Publishing House), is identical with that recorded in the *Guangdong Atlas*. The *Collection of Guangdong Local Gazetteers from Past Dynasties* includes both the *Guangdong Atlas* and *Annotation of Guangdong Atlas*. Both of these documents are listed as engraved in 1866; however the signatures of the main officials indicate that the *Annotation* book was published later than the *Atlas*.

to compile the *Guangdong Atlas*.² Chen Li and Zou Boqi were the co-directors of the Xuehaitang 学海堂 academy. This academy had been founded in 1825 by Ruan Yuan 阮元 (1764–1849), the literary arena leader and governor-general of Guangdong and Guangxi provinces [4]. The Xuehaitang was famous for advocating *shixue* 实学 (practical knowledge). The compilation was finished and engraved in 1866. Then, a more detailed and text-heavy book, *Annotations for the Guangdong Atlas*, was published in 1870. This book explained the regulations and technical parameters adopted in the maps, and recorded far more villages than those marked in the maps. The *Annotations* was edited by Gui Wencan 桂文灿 (1823–1884), a scholar who also had experience in the Xuehaitang.

The drawings for the maps in the *Guangdong Atlas* were based on the Taoist priest Li Mingche's 李明彻 maps, which were printed in the *Guangdong Provincial Gazetteer* [5], compiled in 1822 by Ruan Yuan. Although Matteo Ricci (1552–1610) had introduced the scientific drawing techniques of Western cartography during the Ming dynasty, these techniques were applied only for country-scale maps that were used as tools of dominance by the emperors during the Kangxi 康熙 and Qianlong 乾隆 periods. These techniques were not applied by the local gazetteers for more than two centuries [6]. The maps provided by gazetteers followed the tradition of *ji-li-hua-fang* 计里画方 (*Li-grid*), and the images of prefectures and counties were expressed in the style of Chinese mountain-and-water paintings. Li Mingche was the first map-maker in Guangdong who adopted pseudo-cylindrical map projections. His maps showed the meridian line running through Beijing as the central axis in drawing maps for the *Guangdong Provincial Gazetteer*. Li Mingche measured the latitude of Canton as 23°20', and the longitude as 3°30' W [7]. Gazetteers, in general, included provincial, prefectural, and county maps. The scales of these maps were relatively extensive, and the accuracy of the measurements was quite limited. In *Annotations for the Guangdong Atlas*, the editors commented that “Most of the maps in the local gazetteers have been inaccurate since ancient times”.

In designing the maps for the *Guangdong Atlas*, Zou Boqi applied the graticule based on the legendary measurement unit of ‘construction-ruler’³ [8], which was the same standard used in Kangxi's *Complete Map of the Imperial Territory* 皇輿全览图. However, the period granted for completing the *Atlas* was relatively short, and few trained professionals were available. Zou Boqi faced numerous challenges in attempting to apply the new cartography to various prefectures and counties. The maps of most prefectures were not based on surveys. As Zou Boqi later wrote to a friend, “... as for the drawings delivered by the prefectures and counties, the orientations and distances are not fully understood. It is really difficult to adapt them accurately however you rotate and splice them together” [9]. In fact, among all of the prefectures, only the data for Canton Prefecture was supported by field surveys. Thus, the information on Canton Prefecture is relatively precise, which offers the possibility for conducting a reliable historical analysis.

² The compilation of the *Guangdong Atlas* was organized by Mao Hongbin 毛鸿宾, the governor-general of Guangdong and Guangxi provinces, and by Guo Songtao 郭嵩焘, the viceroy of Guangdong Province.

³ The ‘construction-ruler’ promulgated by the Ministry of Works in the Qing dynasty was called the *yingzao-chi* 营造尺, in which 1 *chi* was equal to 32 cm.

The *Guangdong Atlas* includes a provincial map and various division maps. Prefecture maps and county maps are only attached as an index in *Annotation of the Guangdong Atlas*. The general map of Guangdong Province is summarized into 187 panels, which are divided into 23 volumes along latitude lines, and 20 rows along longitude lines (see Fig. 1). Each panel map consists of two pages. Each page gives a detailed division map, which is 22 cm high and 16.2 cm wide. Each page has four grids along the longitude, and three grids along the latitude, with 5' per grid (see Fig. 2). According to the *Annotations*, “The scale of the map is ten times larger than the Kangxi- and Qianlong-era complete maps of the country. Along the longitude line, 1 *chi* per grid indicates 100 *li* 里,⁴ and in the latitudinal direction more than 9 *cun* 寸 per grid indicates more than 90 *li*”. These standards indicate that the scale of the division maps in the *Guangdong Atlas* is about 1:156,250. Compared with the previous maps in gazetteers, the information presented in the *Guangdong Atlas* is very detailed. It includes mountains, water systems, roads, walled cities, civil and military offices, garrisons, forts, salt offices, key posts, villages, rural markets, academies, Taoist temples, Buddhist monasteries, community schools, historic sites, scenic spots, salt fields, etc.

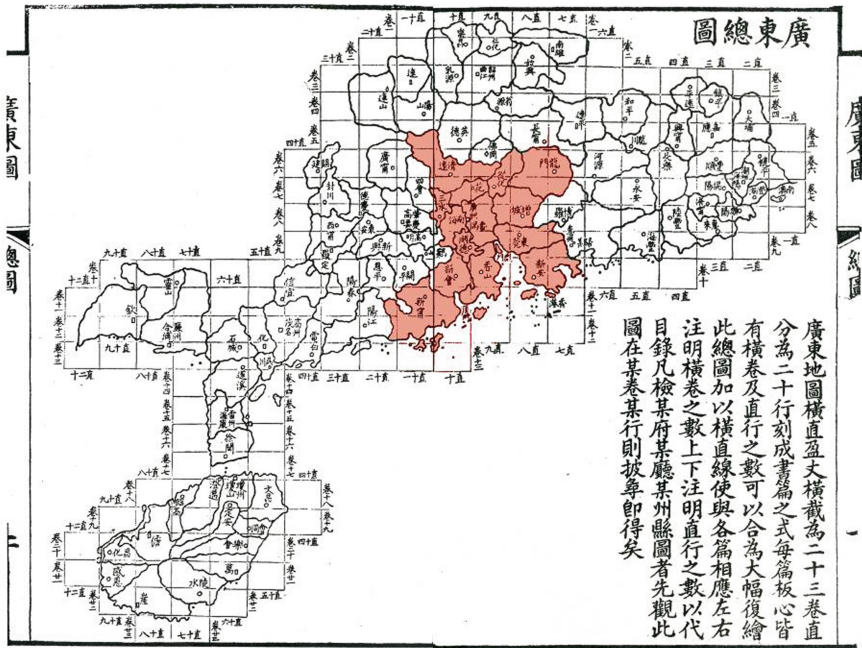


Fig. 1. General map in the *Guangdong Atlas*. Source: authors, adapted from Zou & Chen, 2009, pp. 302–303. Canton Prefecture was shaded red by the authors.

The hierarchy of rural governance and the main social and environmental factors for the counties were clearly recorded in *Annotations for the Guangdong Atlas*. The

⁴ Each *li* equals approximately 500 m.

county—*xunjiansi* 巡檢司 (government agency in the countryside in charge of managing townships)—and the *daxiang* 大鄉 (which literally means “big township”), formed the administrative hierarchy of the rural areas. The rural settlements were recorded as having two levels, according to the dimensions of *daxiang* and *xiaocun* 小村 (which literally means “small village”). A township consisted of several villages or several tens of villages. The terms for a “township” could be *du* 都, *tu* 圖, *bao* 堡, *jia* 甲, *wei* 圍, *yue* 約, *she* 社, or *pu* 鋪. The *Guangdong Atlas* marked all of the townships and core villages. Many smaller villages were listed in the *Annotations*, and were not shown on the maps due to limited space.

Figure 2 presents an example, namely a panel from Vol. 10, Row 9, which shows a part of Xiangshan 香山 County, at the south edge of Canton Prefecture. In this panel, the graphic information drawn includes grids, mountains, rivers, the coastline, islands, a walled city as the seat of the county, 32 *xun* 汛 (garrisons), and the administrative boundary between two counties. The text notes give the names of hills, rivers, islands, the walled city, *xunjiansi*, townships, villages, rural markets, *xun*, forts, thermal springs, *shatian* 沙田 (or sand flats), and the index information.

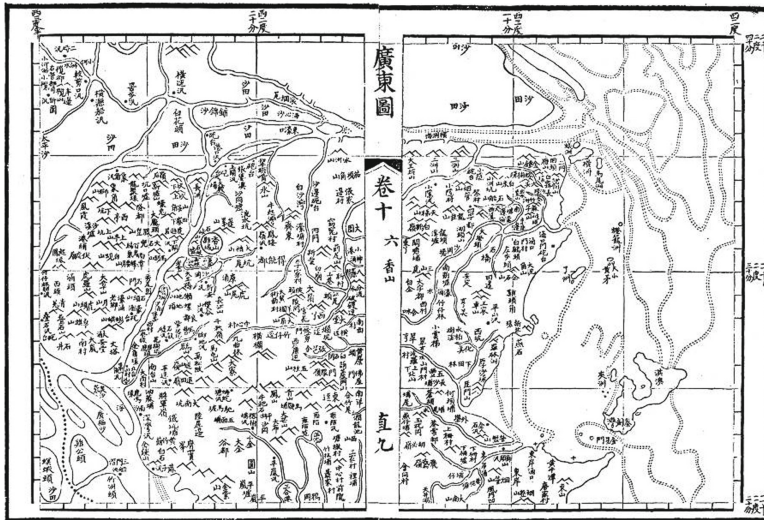


Fig. 2. Panel in Vol. 10, Row 9 of the *Guangdong Atlas*. Source: Zou & Chen, 2009, pp. 376–377.

These maps can support research on the whole of Canton Prefecture, and not simply on the county level. The maps can confirm not only the distribution and density of various settlements with reference to other documents, but they can also provide the specific locations of settlements. Therefore, we can explore the contexts of village clusters and their relationships with the surrounding main geographical elements, especially in terms of discerning the primary influencing factors for village formation.

3 Canton Prefecture in the *Guangdong Atlas*

No prefecture-level map is included in the *Guangdong Atlas*. Only the annotation book includes a simplified prefecture map before the index that is too generic to be used for the study of village distribution. However, we collaged 79 division maps from 45 panels to make a Canton prefecture map, with detailed information for analysis at the region level (see Fig. 3). In this collage of maps, the boundary of Canton Prefecture is shown with a red line, and the boundaries between the counties are presented in red thin lines. Canton Prefecture occupied the core area of the Pearl River Delta, covering an area of about 30,510 km² (sea surface not included).⁵

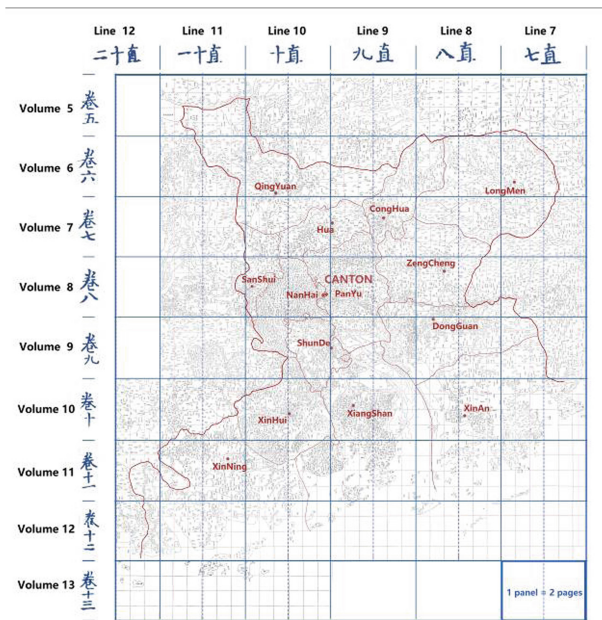


Fig. 3. Canton Prefecture in the *Guangdong Atlas*. Source: 79 division maps from Zou & Chen, 2009, collaged and adapted by the authors.

When Canton Prefecture was established during the early Ming Dynasty in 1378, the administration area included eight counties [10]. When the *Guangdong Atlas* was compiled, Canton Prefecture had jurisdiction over 14 counties, including Nanhai 南海, Panyu 番禺, Shunde 顺德, Dongguan 东莞, Conghua 从化, Longmen 龙门, Zengcheng 增城, Xinhui 新会, Xiangshan 香山, Sanshui 三水, Xinning 新宁, Qingyuan 清远, Xin'an 新安, and Huaxian 花县. All of the seats of these counties are marked in Fig. 3. At that time (in the 1860s), Hong Kong belonged to Xin'an County, and Macau was a part of Xiangshan County. Canton Prefecture was the leading center in Guangdong Province, which was the core area of Cantonese culture.

⁵ The map does not present the complete sea area of Canton Prefecture.

This paper examines the spatial distributions of rural settlements in Canton Prefecture during the late Qing Dynasty, the relationships between villages, and the main influencing factors on rural life, such as mountains, waterways, cities, and rural markets (including *xu* 墟, *shi* 市, and *xun*). There were 179 townships, 3,513 villages, 259 *xu*, 20 *shi*, and 442 *xun* marked on the maps. In addition, 393 townships, 6,576 villages, 354 *xu*, 73 *shi*, and 601 *xun* were recorded in the annotation book (see Table 1). All of the *xu*, *shi*, and *xun* were listed under the category of *wanglai-dadao* 往来大道, which literally means “broad way”, because all of them were located in places with convenient transportation routes. As mentioned before, the deviations in the numbers of villages presented in the *Atlas* and the *Annotations* stem from the fact that many of the small villages were not marked in the maps.⁶

The villages marked on the maps have histories of more than 150 years till now, as was verified in many cases through our *in situ* investigations. Although some of the villages have disappeared due to urbanization, in most of them the traditional morphological structures and the historic features of some vernacular buildings are still recognizable.

According to the statistics given in Table 1, Longmen, Panyu, and Nanhai were the three counties with the largest numbers of townships, with 86, 77, and 68 respectively. Conghua and Xinning counties had the fewest townships, having only 4 and 6 townships, respectively. Longmen County had the largest number of villages, which was 1,072. Following this, Nanhai County had 972 villages. The county with the fewest villages was Qingyuan (with 162). It is clear that the numbers of both *daxiang* and *xiaocun* varied greatly among the counties.

The townships and villages were inspected by the officials stationed in *xunjiansi*. Mudeli Si 慕德里司, of Panyu County, managed 32 townships, which was the largest number in Canton Prefecture. Several of the *xunjiansi* managed only 1 township. There were 264 villages in the seventh *du* 七都 township of Xin'an County, but 9 townships in the prefecture had only 1 village. Nanhai County, which had the largest number of “broad ways”, had 128 rural markets and *xun*. Longmen County, which had the largest number of townships and villages, had only 19 “broad ways”. These differences show that the relationships between villages, rural markets, and *xun* were not positively related in terms of their numbers in each area.

These findings raise new questions. What was the context for the scattered distribution of rural settlements in Guangzhou? What clues can be discerned regarding the morphogenesis of village clusters?

Studies on the morphological layout of traditional villages in certain regions of China have provided explanations from the perspectives of ethnic groups, dialect, cultural anthropology, and regional development history, among others. In general, Cantonese-speaking lineage villages in Canton Prefecture built regular patterns of structures around ancestral halls. The villages gradually developed from a central layout, with the ancestral halls in the center, to a comb-shape-layout with ancestral halls at the front [11]. In areas with shallow hills, the comb-shape layout was stretched into a radial form. In addition, Hakka villages, which were usually surrounded by a wall with their ancestral altars in the middle, were also present in Longmen, Conghua, Qingyuan, Zengcheng, Xiangshan,

⁶ The only exception is Xinning County, which has more villages marked in the map than those listed in the *Annotations*.

Table 1. Settlements of Canton Prefecture given in the *Guangdong Atlas (GA)* and *Annotations for the Guangdong Atlas (AGA)*. Source: authors.

County	Township		Village		<i>Xu</i>		<i>Shi</i>		<i>Xun</i>		<i>Lying soldiers</i>
	<i>GA</i>	<i>AGA</i>	<i>GA</i>	<i>AGA</i>	<i>GA</i>	<i>AGA</i>	<i>GA</i>	<i>AGA</i>	<i>GA</i>	<i>AGA</i>	
Nanhai	63	68	460	972	28	62	0	21	61	64	1,905
Panyu	39	77	337	638	29	41	6	18	29	64	2,293
Shunde	6	41	219	274	0	11	0	0	37	40	1,013
Dongguan	0	20	246	302	16	24	1	1	47	87	4,375
Conghua	4	4	149	324	17	19	1	1	7	8	209
Longmen	41	86	133	1,072	13	11	0	1	12	14	292
Zengcheng	11	12	175	682	23	29	2	0	22	21	729
Xinhui	2	15	365	459	18	33	4	14	43	54	1,127
Xiangshan	10	13	398	516	11	12	0	10	59	88	2,301
Sanshui	3	16	124	289	13	23	0	0	16	15	561
Xinning	0	6	415	206	26	18	0	0	25	38	1,025
Qingyuan	0	9	155	162	38	33	2	0	35	48	676
Xin'an	0	7	201	429	8	18	3	5	36	53	2,285
Huaxian	0	19	136	251	19	20	1	2	13	7	179
Total	179	393	3,513	6,576	259	354	20	73	442	601	18,970

Xin'an, Xinhui, Xingnin, Sanshui, and Nanhai [12]. Actually, the typical Hakka building, the *weilongwu* 围龙屋, was rarely present in Canton Prefecture. Furthermore, it is worth pointing out that villages fronting on water along the coastline, or along canals in sand field areas, were not marked on the maps. The cartographers intentionally ignored the existence of such villages and settlements of Tanka people, or the villages of tillers who did not own their own land. This ignoring of some villagers implies that their names were not on the lists of tax-payers.

For this investigation, it is necessary to explore the internal differences within areas of the same dialects, or regions of the same ethnic groups. Interpreting the *Guangdong Atlas* can broaden our knowledge about the villages of the late Qing Dynasty from an historical geography perspective. Based on a close reading of the *Atlas*, the following sections will evaluate the spatial distributions of villages, and their relationships with mountains, waterways, walled cities, rural markets, and *xun*.

4 The Morphogenesis of Villages in Canton Prefecture

During the Ming and Qing dynasties, local villages steadily spread and branched out across Canton Prefecture, in a process of regional land reclamation. This process was influenced not only by natural geographical factors such as mountains, water systems, or the ocean, but also by social and economic factors such as politics, warfare, immigration,

native-guest group relations, livelihoods, international trade, or local beliefs. The people who settled in this prefecture were constantly transforming their natural environments. Such large-scale reclamations and landfilling of riparian and coastal zones led to great changes in the landscape [13]. Clear relationships can be seen between villages and specific mountains and waterways. Mountains and waterways provided natural geographical conditions, constituted the base context for village distribution, and acted as the main factors shaping village networks. The notation on city features such as *xunjiansi*, *xunqia* 卡 (checkpoints), tax factories, customs houses, and other facilities demonstrates the existence of the administrative and military system, which constituted the institutional governance by which the rural areas were controlled. Academies and community schools offered stepping-stones for upward mobility through imperial examinations, channeling education to rural people and exposing them to the official ideology. Rural markets were spatial nodes that reflected the commercial vitality of rural areas, and connected the villages through economic links.

Although Longmen County had the largest number of villages, the area with the most intensive concentration of villages on the maps was in the river network area of Nanhai-Panyu-Shunde-Sanshui. This area showed a rapidly-increasing presence of large villages. The villages in the upper reaches of the Beiji River 北江, Liuxi River 流溪河, and Zengjiang River 增江 (in Longmen County) showed relatively sparse distributions of villages. Such differing densities of large villages reflected a topographic distinction between the river valleys and the flood plains.

Due to their small scale and limited population, small villages had little impact on the locations of public facilities, and the villages' connections with "broad ways" were relatively weak. Therefore, analyzing the rural context by assessing the settlements and facilities that were indicated in the maps is a suitable method for showing the morphogenesis of rural communities. The GIS analysis given below is based on the original information presented in the maps.

4.1 Lying on Hills: The Relation Between Villages and Mountains

The *Guangdong Atlas* uses "herringbone" icons to represent peaks, and repeated this icon continuously to represent the trend of mountain chains. In the annotations book, the locations of mountains were described by their directions and distances in relation to the county seats. However, the altitudes of the peaks were not indicated.

Topographically, Canton Prefecture has a higher area in the north and a lower area in the south, as the landscape slopes downward from the inner mountains to the Pearl River estuaries. From the mountains in the north, a horseshoe-shaped zone of mountains is found. The outer belt consists of the mountains in Xin'an, southeast Dongguan, Longmen, north Zengcheng, north Conghua, south Qingyuan County, east Zhaoqing Prefecture, and Xinning County. Nowadays, it is determined that these peaks are mostly between 500 m and 1,200 m high. The inner belt consists of the hilly areas with altitudes mostly lower than 500 m, as found in mid-Dongguan, north Panyu, north Huaxian, north-west Sanshui, and southwest Xiangshan. Inside the inner belt is an area of shallow hills and a plain, where most people lived during the Qing dynasty. Finally, close to the ocean lies the enormous sand field area in southeast Panyu, east Shunde, northeast Xiangshan,

and west Dongguan. The sand fields are artificial fields that have been reclaimed from the sea [14].

The green lines shown in Fig. 4 express a schematic diagram of the continuous mountain ranges, which is formed by connecting the peaks on the map with lines. This figure shows that many villages are distributed along the mountain range. In the mountainous area, the watersheds are divided into relatively independent river basins, including the Zengjiang River Basin in Zengcheng and Longmen, the Liuxi River Basin in Conghua and Huaxian, the Beijiang River Basin in Sanshui and Qingyuan, or the Dongjiang River 东江 Basin in Dongguan County. The mountains are always accompanied by valleys. The valleys are nourished by the convergences of waterways, which are conducive to farming and settlements. Most inland villages were located in this area. On the maps, most villages were distributed along the feet of the mountains, including 81 villages in Zengcheng County and 71 villages in Conghua County. In contrast, far fewer villages were marked in the large flat areas surrounded by the mountains (see Fig. 5). The reason for this pattern was that it was fairly easy to prevent flooding and not too difficult to get water in the piedmont, but the plains among the mountains had to be saved and transformed into farmland preferentially.

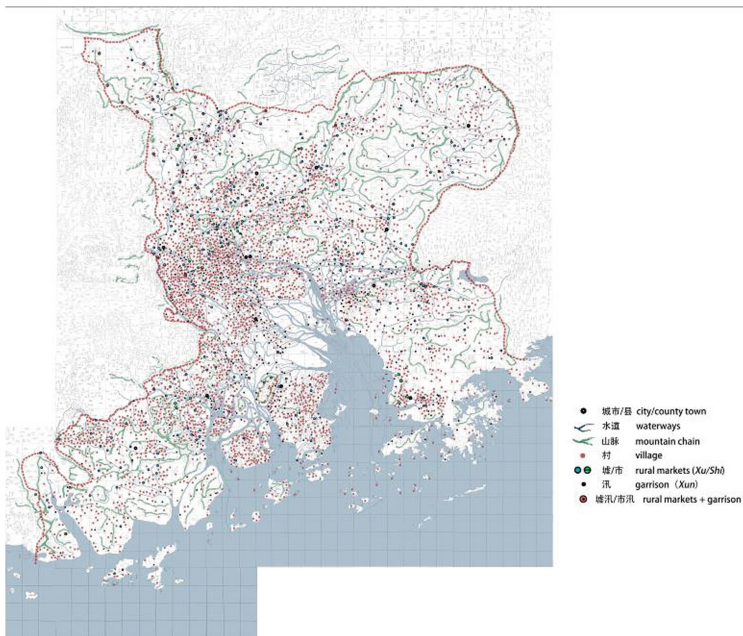


Fig. 4. Villages, rural markets, and *Xun* marked in the *Guangdong Atlas*. Source: authors.

The southern part of Canton Prefecture is close to the estuary of the Pearl River. The altitude is relatively low, and the mountains are mostly independent hills and hillocks. These hills show little fluctuation, but they produce complex changes in the environment. Many villages were located on these hillocks. In Panyu County, 74 villages along the



Fig. 5. Villages along the mountains in Conghua County. Source: Zou & Chen, 2009, p. 605.

hillsides can be found on the map. Usually, the buildings in these villages were arranged around a pond and lying on the hills. Their main lanes were perpendicular to the contour lines, to help discharge the intensive summer rainfall to the water bodies as quickly as possible.

Moreover, as mountains presented more complicated conditions for construction, some hills acted as the conceptual backs of villages, and other hills were considered as worship mountains, to guide the orientations of vernacular buildings. Among the various landforms in Canton Prefecture, mountains have provided the primary geographic characteristics, influencing the locations and orientations of villages. Mountains have also played a pivotal role in the consideration of *fengshui* 風水 (geomancy) [15]. In some villages with lower terrain, a small hillock 5- to 10-m-high may be regarded as a mountain in terms of geomancy.

The influence of mountains is also reflected in the names of villages, many of which are named with the characters *Shan* 山 (mountain), *Gang* 岡 (hummock), *Ling* 岭 (ridge), or *Dong* 洞 (cavern). All of these names suggest that mountains have long been regarded as the most distinctive environmental elements for these villages. In addition, 46 villages and places named *Jing* 迳 are marked in the map. This name literally refers to a main road between mountains.

4.2 By the River: Villages and Waterways

For village inhabitants, rivers signify potable water, irrigation sources, rich aquaculture production, beautiful scenery, beneficial micro-climates, and silt for reclaiming sand fields. At the same time, rivers also threaten their drainage basins with the risks of flooding and waterlogging. Water and land are the primary considerations of site selection when a village is constructed. As the Canton Prefecture is an area where many rivers terminate, the water systems provide primary clues for the configurations of villages in this prefecture.

Two main types of water are shown in the maps: rivers and the sea. Several hot springs are marked, but few lakes. Many of the existing ordinary ponds were not mapped, because their scales were too small. All of the waterways in Canton Prefecture belong to the Pearl River system, which has three main streams and eight estuaries, all of them draining into the South China Sea on the prefecture's southern borders. The Xijiang River 西江, Beijiang River, and Dongjiang River are the three main streams, and the Zengjiang River, Liuxi River, Bajiang River 巴江河 and Tanjiang River 潭江 are also important in certain areas. During the mapping process, the cartographers noted that "the curves and straight lines of waterways and the connections between the alluvions are studied very carefully" [2]. The annotations book listed the sources of each county's watercourses, along with their routes, directions of flow, and confluences. However, no information is given about the volumes or velocities of the river flows, or the widths of the water surfaces, or the water levels at high or low tides.

An intricate topographic ladder shapes the various forms of water systems. In the mountainous areas of Conghua, Longmen, Zengcheng, Huaxian, and Qingyuan counties, the water systems involve dendritic drainage. The Liuxi River, Zengjiang River, Tanjiang River, and Bajiang River in mountainous areas, and the Beijiang River before its confluence with the Xijiang River, have normal tree branch shapes. In Nanhai, Panyu, Shunde, Dongguan, and Xiangshan counties (each of which have several rivers flowing together), very special deltas with hydrographic net areas have formed (see Fig. 6). Following the water from where the West River and the North River converge to where the Liuxi River meets a segment of the Pearl River, a fertile flat area is found, which has the prefecture's densest population. During the Tongzhi period, this river route was the most important means of transportation in the Canton Prefecture. Only in areas where no waterway was available did land-based routes develop.

By comparing the distributions of villages, waterways, and canals, it can be seen that although the villages had many different locations, most of them were strongly influenced by the presence of water. Only a few villages were completely separated from waterways and existed as inland villages. The average distances between villages and the nearest water systems were calculated by GIS, and the results are shown in Fig. 7. Among all of the marked villages, 76% of them were located within 2 km of the nearest major watercourse, and 53% were less than 1 km from water. The average distance was relatively small. For example, in Panyu County, 104 villages noted on the map were located quite close to the canal. However, villages generally maintained a certain distance from the main streams of wide rivers. Although the villagers kept their communities at a safe distance from the main streams, they managed to connect their

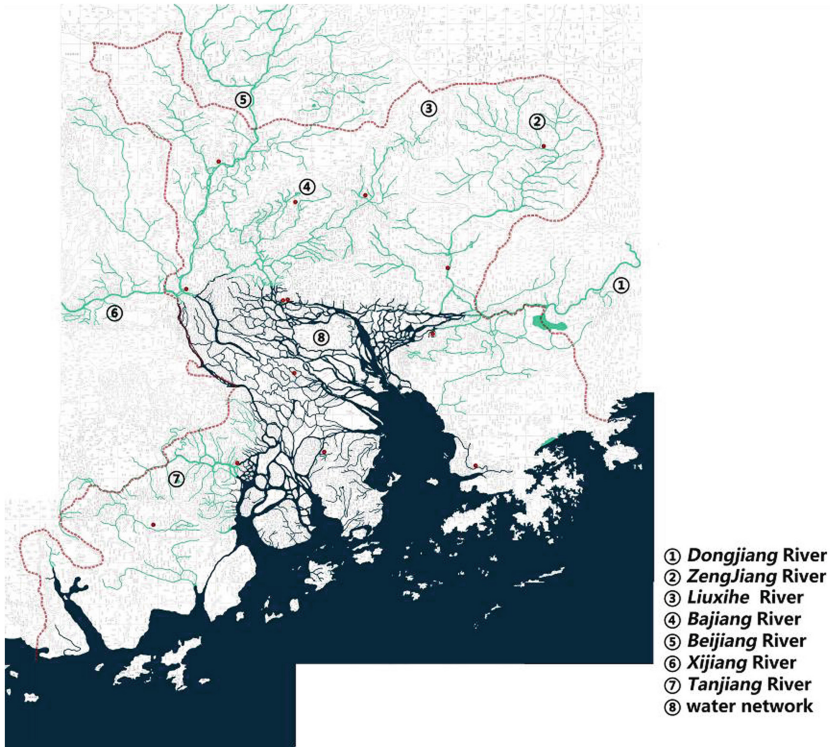


Fig. 6. Waterways of Canton Prefecture in the *Guangdong Atlas*. Source: authors.

villages to the main watercourse through secondary canals. They tried to access nearby waterways, while also avoiding the disastrous effects of floods as much as possible.

The maps indicate that the further downstream toward the ocean the riverside villages were, the more commonly they were named by the natural forms of river systems, such as *jiang* 江 (river), *hai* 海 (sea), *chong* 涌 (canal), *jiao* 滙 (tributary), *xi* 溪 (brook), *pu* 浦 (riverside), *wan* 湾 (cove), *tan* 潭 (pool), or *li* 沥 (shallow water). Other place names indicating topography and structures related to water included *sha* 沙 (sand), *zhou* 洲 (island), *bu* 埠 (dock), *tang* 塘 (pond), *lang* 壟 (low land), *bei* 陂 (dam), and *dun* 墩 (mound). All of these place names reflect the great influence that water systems had on the site selection and construction of villages.

4.3 Close to the City: Villages and Walled Cities

Walled cities were not only political and cultural centers, but also prosperous commercial centers that provided villagers with access to trade. The international trade routes set along the coast had a great impact on the villages of Canton Prefecture. Similarly, cities were the centers from which official ideology could infiltrate or influence the countryside. The villages of Canton Prefecture gained new characteristics thanks to commerce, warfare, international communication, and the development of cities.

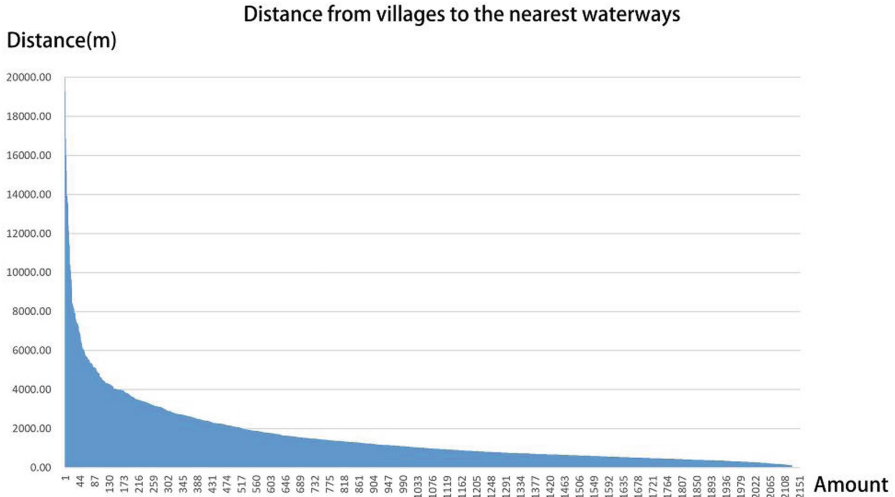


Fig. 7. Distances between villages and their nearest rivers. Source: authors.

In the maps, the county seats are represented by circles. In the annotations book, the perimeters and heights of the city walls, and the widths and depths of the moats are recorded. Within the territory of Canton Prefecture, the main walled cities were Canton (which was the seat of both the province and the prefecture, as well as the seats of Panyu County and Nanhai County), 12 seats of other counties, and 9 earth ramparts and walled towns for the military stations.

The waterfront areas of broad rivers were threatened by floods and tides, and these areas were therefore dangerous for villages and for daily rural life. However, the crucial links between land and water enabled transportation for walled cities and market towns. All of the county seats were located near the watercourses, because the rivers were convenient for both shipping and for forming natural military barriers. Qingyuan, Sanshui, Xinhui, and Dongguan counties were even located close to the main stream of the Pearl River. The walled cities were typically built between the mountains and the river. As Guanzi 管子/乘马 said, “Do not get too close to the high ground so the water supply is sufficient, and do not get too close to the low-lying water so the drainage ditches can be reduced”.

Canton City was built in 214 B.C., with the Yuexiu mountains at its back, and facing toward the sea. The city was connected to the hinterland through three rivers, and to foreign countries through the ocean. Canton at that time was a place where villagers shifted their focus from their farmlands to the outside world, and trod a path toward foreign trade. As Canton was the only Chinese city that was continuously and officially open to international trade during the Qing dynasty, the ports of Whampoa 黄埔 and Changzhou 长洲 (along with various villages nearby) were closely bound up with international commercial activities. Furthermore, many villages of Canton Prefecture were involved in international trade, either directly or indirectly. In other words, proximity to cities has typically introduced social and economic change to the villages around them.

In some cases, cities have led villagers to plant cash crops and develop handicraft industries instead of focusing on primary agriculture. As a result, the famous market towns without city walls, such as Foshan 佛山, Shilong 石龙, and Chencun 陈村, have also played important roles. The villages near the county seats have had more opportunities for trading their agricultural and handicraft products. In general, the density of villages around the cities has been relatively high (see Fig. 8).

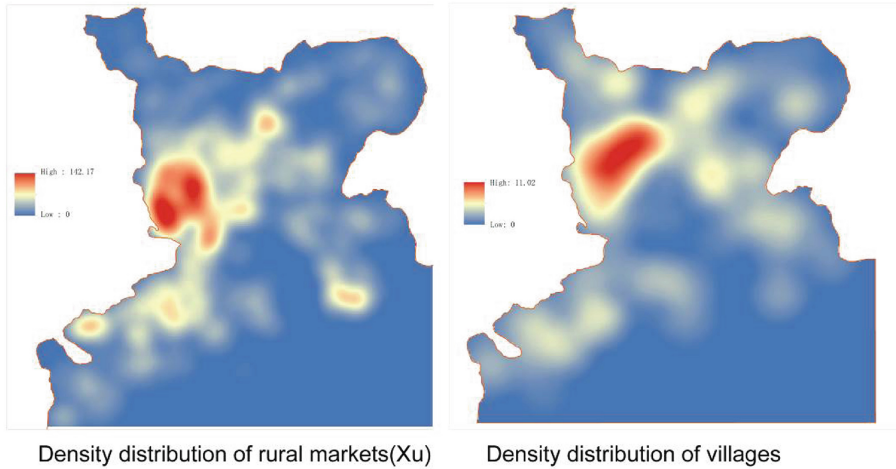


Fig. 8. Distributions of markets and villages. Source: authors.

4.4 *Chenxu*: Villages and Rural Markets

Rural markets were the most common trading places for the villages of Canton Prefecture, including *xu* and *shi* markets. The event of a *xu* was usually organized two or three times during each ten days. The numeric-related names of markets referred to their chosen dates for *xu*. For example, the market days for *three-eight xu* were the dates of 3, 8, 13, 18, 23, and 28 in every lunar calendar month. *shi* usually ran every day to serve the residents nearby, or acted as distribution centers for certain kinds of goods such as *sishi* 丝市 (silk market) or *xiangsi* 香市 (incense market). Cantonese people referred to buying and selling in the market as *chenxu* 趁墟. The markets were scattered among many villages, most of which were sited on open grounds near the waterways, for access to convenient waterborne traffic. The rural markets in this region developed rapidly during the period when Guangzhou became the only port for international trade from A.D. 1757 to 1842. Some of these markets were set up by the government, and others were set up on private land, with the owners collecting fees from the merchants. As can be found in Zengcheng County, the *xiaxu* 下墟 was recorded as the tax land of Xiong's family, and the *xinxu* 新墟 was the tax land of Zhang's family [16].

In the *Guangdong Atlas*, 275 *xu* and 20 *shi* were marked in Canton Prefecture. In the *Annotations*, 354 *xu* and 73 *shi* were listed. According to notations shown on

the maps, there was (on average) a market for every 12.7 villages. According to the number of villages listed in the annotation book, there was a market for every 15.4 villages (on average). Nanhai County had the largest number of rural markets, with a total of 84. Shunde, which was a developed county with a high level of agricultural commercialization, had only 11 *xu* and 1 *shi* listed in the annotation book, the smallest number of markets among all of the counties, and none of its markets were marked on the map. However, according to the records in the *Shunde Gazetteer* during the Xianfeng 咸丰 period (1851–1861), there were 91 markets in Shunde before 1853. Other studies suggest that the number of counties and cities was far higher than that recorded on the maps, and in general their numbers were steadily increasing. For example, in the Jiaqing 嘉庆 period (1796–1820), there were 43 recorded rural markets in Zengcheng County, only 26 of which were listed in the Tongzhi *Guangdong Atlas*. In 1835, there were 17 rural markets in Jiujiang Bao of Nanhai County, [17] but only 3 of them were recorded in the *Annotations for the Guangdong Atlas*. It is possible that only the official rural markets were listed.

The distribution of villages was not spatially homogeneous. Through a density analysis of villages and markets by GIS, it can be observed that the markets and villages had a certain positive correlation in terms of density in distribution (see Fig. 8). However, on a smaller scale, it is found that there was no direct correspondence between the quantities of markets and of villages, although markets and villages should logically be related to the total amounts of commercial activity, population, and the scales of each single market.

In addition, many rural markets were placed at the confluence of rivers, but there were also many near the rivers' terminuses (see Fig. 9). Such places were easily accessible by both water and land, so they could serve the hinterland further away from the river, and get the benefit of strong tidal jacking on the Pearl River. Boats could easily take advantage of the rising tide to go upstream in an era before machine-powered water transport. For example, the Guizui 龟嘴 market (in Conghua) was one of more than ten markets and docks along the Liuxi River. This market started to function during the Song dynasty, and it connected Canton City (downstream) with Conghua County (upstream). Moreover, according to the *Guangdong Xin Yu* 广东新语, the market's official wharf was opened during the Ming dynasty, to help transport Liuxi paper to Canton City [18]. In fact, the remains of the old wharf and ancient market can still be seen today.

In the mountainous areas that lacked water transportation, other local markets relied mainly on land transportation. In the sand field area, no markets were marked on the maps, or listed in the annotation book. In Hong Kong, only the Yuen Long 元朗 market was recorded on the map, and only Tai Po 大埔, Kwai Chung 葵涌, and a few other markets were listed in the annotations book. Macao's foreign market was recorded in the book, but not marked on the map.

As traditional markets were originally open spaces, many of them had no permanent buildings, and only location-related information remains. In some of these markets, arcade buildings were erected during the period of the Republic of China, such as the arcades of Benghu Xu 蚌湖墟 and many of the markets along the Xinning railway. As today's traffic is dominated by roads rather than waterways, many of these traditional markets have been abandoned.

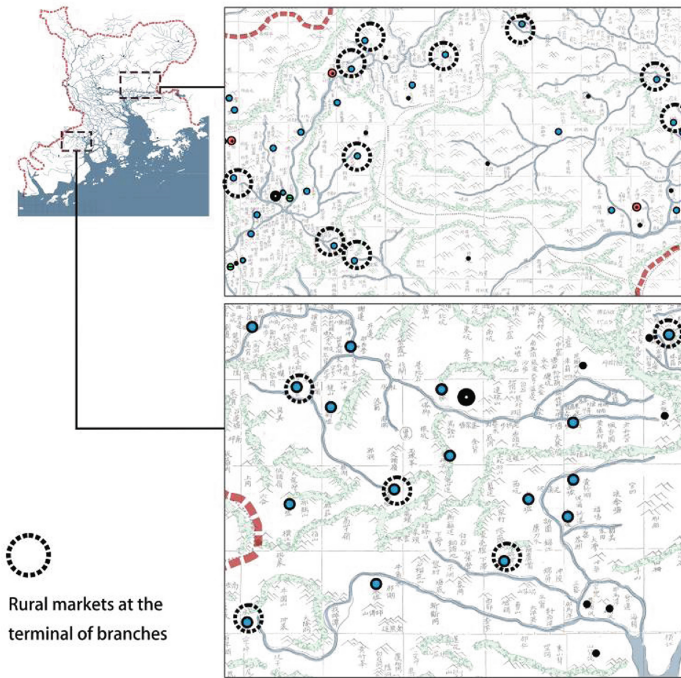


Fig. 9. Rural markets near the terminals of river branches. Source: authors.

4.5 Military Guard: Villages and *Xun*

During the Qing dynasty, the majority of Han troops were called *lvying* 绿营 (or “green camp”) soldiers. These troops were divided into four levels, i.e., *biao* 标, *xie* 协, *ying* 营, and *xun* 汛. The *lvying* soldiers were spread out in small garrisons named *xun* instead of big camps for coastal defense, policing, and various other minor duties, so the distribution of *xun* was relatively scattered. Serving as the most basic units of green camp troops, the *xun* were each guarded by several few to hundreds of soldiers. Furthermore, according to their geographical locations, troops were posted to *tang* 塘 (small barrack) and *qia* in the mountainous area, which were established to monitor water sources and mountain passes, respectively.

In the atlas, the location of each *xun* is marked with a black dot. There were 427 *xun* in Canton Prefecture. These were densely concentrated at the entrances and exits of the coast areas, on both sides of each main waterway, and near the walled cities. *xun* were also established in relatively remote mountainous areas. The distribution of *xun* depended largely on the water system, and the characteristics of that distribution were consistent with that of villages and rural markets on the regional scale. Some of the *xun* were located in the *xu*, *shi*, or in villages, and were recorded as *xuxun* 墟汛, *shixun* 市汛, or *cunxun* 村汛, correspondingly. From a microscopic perspective, by looking closely at the locations of *xun*, we find that their locations usually depended on rivers and conformed to the density distributions of the river systems, villages, and rural

markets. However, a different pattern of *xun* locations appeared in the interior areas. As military forces, the *xun* served to enable governance by the central court, and therefore some *xun* were located in areas having very few villages or markets. For example, in the river flow area where the Xijiang River, Beijiang River, Liuxi River, and Pearl River meet, *xun* were mostly located on the shores of the main channels and on land toward the ocean side. In contrast, the markets and villages were mostly located near river branches or on land toward the interior side. The same set of phenomena could be found in the area of Dongguan County and the Dongjiang River Basin (see Fig. 10).

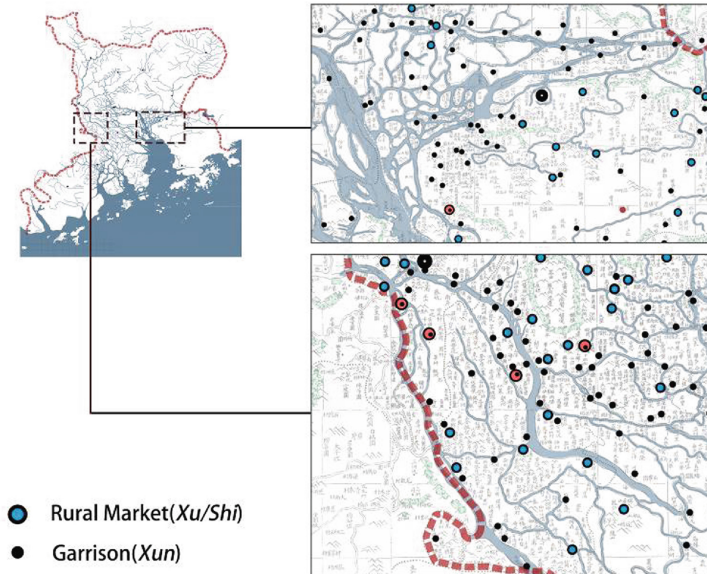


Fig. 10. Distributions of *xun* (garrison) and rural markets. Source: authors.

According to the annotation book, 18,970 soldiers were stationed in the counties of Canton Prefecture, with Shunde County having the most. In most cases, there were only 3 to 12 soldiers in a small *xun*, but the forts were relatively large. The Shanghengdang *xun* 上横档炮台汛 had 407 soldiers. The *Atlas* also showed 19 *xun* in Hong Kong, including the Kowloon Walled City 九龙寨, the Tuen Mun *xun* 屯门汛, and the Wangxia *xun* 望厦汛 in Macao.

Furthermore, the coastal area outside Humen 虎门 had too few villages to help prevent an invasion from the sea. For a long period, only *zhaicheng* 寨城 (military settlement), the forts, and the fishing villages existed there. Most of the forts remain today. However, the spatial characteristics of common *xun* are difficult to identify, because few architectural heritage sites related to common *xun* remain. Perhaps this is why the relationship between the *xun* and the villages has not yet been duly appreciated by researchers of architectural history.

5 Conclusion and Discussion

The relatively detailed and accurate records for Canton Prefecture given in the *Guangdong Atlas* and *Annotations for the Guangdong Atlas* provide valuable evidence for the study of rural settlements in the late Qing Dynasty, and convey the knowledge and ideas of map-makers. The maps not only offer important data on townships and large villages during the Tongzhi period, but also display the spatial relationships between them. Mountains, waters, and cities were all factors that affected the distribution of villages. These were the elements that connected the village groups found on hillsides, riversides, and suburban areas, respectively. Markets and *xun* were interwoven into the rural network, becoming important nodes in the rural landscape and rural life. Villages were the first forms of settled existence and lifestyle. The effects that mountains, rivers, cities, rural markets, and *xun* had on villages tended to overlap and merge in shaping the context of village and rural life in the late Qing dynasty.

Humans and their settlements coexist with nature as they transform nature. The relationships between villages and natural environments are what matter most. Villagers are typically engaged in production with nature. Hunting in mountain areas, and fishing by the sea and in rivers have continued as important activities for mountain villages, fishing villages, and Tanka villages in Canton Prefecture. Agricultural settlements originated with primitive cultivation, and with the initial reclamation of cropland in the mountains and lower hills. Over time, this process developed into the large-scale reclamation of sand fields during the Ming and Qing dynasties, because such land was capable of providing a relatively stable livelihood for growing numbers of people. Mountains and water also played dominant roles in geomancy considerations, which determined the orientations and layouts of Canton Prefecture's villages.

With the development of aquaculture, handicraft industries, and commerce, rural markets became fixed trading places for groups of villages. Agriculture and irrigation generated villages, and the villages gestated and fed the cities and towns. It was the countryside that originally defined the lifestyle of Canton Prefecture's inhabitants through a bottom-up process of development. Then the cities reshaped conventions in a top-down way. The imperial court governed the local areas by establishing administrative towns, by sending officials and troops, implementing the official political ideology, levying taxes, and consolidating political power. The cities and markets then increasingly shaped village life and the networks of central places in the region. Along the trade routes, and especially the international routes, many villages were no longer focused exclusively on farming, but instead were active participants in a wider economic system. Moreover, rural villages had to face bands of "robbers" and "roving bandits" engaged in plundering, smuggling, and other businesses [19]. *Xun* were then established to place military forces in the countryside, which also affected settlement patterns, although the spatial impact of these forces on rural settlements remains to be further studied.

The atlas provides an historical context for Canton Prefecture in the Tongzhi period by presenting the names and locations of traditional settlements, including maps showing the situations of Hong Kong and Macao, which indicates the great changes that have occurred in the landscape.

Through the maps, we can also discern the thinking of the cartographers, who mainly collected and recorded their information from the official point of view. Although the

survey and mapping procedures were relatively scientific and detailed, the cartographers emphasized the roles of geographical knowledge, administration, and military or economic conditions. The map-makers intentionally ignored the settlements in the sand field area. In addition to their patterns of physical factors, the villages of Canton Prefecture also formed social networks through the ties of lineages, intergenerational marriages, sacrificial circles, and folk activities. These social factors could not be properly assessed through research exclusively based on the Tongzhi *Guangdong Atlas*.

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