Comparative Study on Spatial Forms of Ancient Waterside Towns Based on Google Earth Pro—Taking the Example of Qingmuchuan, Fenghuang and Houliu in Southern Shaanxi, China

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Abstract: The purpose of this study is to address the problem of ancient towns dying out in developing countries, particularly China. Intensifying conflicts between human settlements and the natural environment are described, and guidelines are proposed for the development of waterside ancient towns in China’s southern Shaanxi Province in the interest of conserving cultural and natural heritage. The towns of Qingmuchuan, Fenghuang and Houliu were selected as representative examples due to their strong reputation among tourists. They have the characteristics of traditional southern Shaanxi towns, but each has a completely different layout, space and structure. The comparative findings of this research provide a point of reference for establishing guidelines to preserve the integrity of ancient towns worldwide. In this paper, we compare the geographical conditions with the layout and texture of the streets by Google Earth Pro. And we analyze the details of spaces along the river zones, architectural styles and building decorations in order to research the relationship between the natural environment and the human settlement conditions. We note the unfortunate common trend of commercial development steadily taking over the natural environment, particularly the rivers and unique elements of the old towns. Finally, we summarize the similarities and differences of the spatial forms among these towns and put forward proposals for the further development of ancient towns. This research is important for all regions which stand to lose their national treasures. Consequently, measures should be to taken to curtail hyper development before we lose our historic scenary.

Key words: Google Earth Pro, waterside ancient towns, comparative study on spatial forms, Qingmuchuan, Fenghuang, Houliu.

1. Introduction

After thousands of years of continuous integration between nature and human life, waterside ancient towns, spaces with traditional human habitation, have formed spatial patterns that are completely different from that of modern cities. Obviously, ancient waterside towns can better meet people’s psychological needs and behavioral lifestyle. Because of the natural surrounding environments and the unique regional cultures, they have become desirable destinations for people. How can we integrate the wisdom and culture of traditional waterside towns into our modern cities? In this paper, authors explore this question by analyzing the spatial patterns of ancient towns. Using the functions of global satellite positioning and satellite remote sensing of Google Earth Pro platform, we obtain high-definition images of three ancient towns in real time. The three waterside towns of Fenghuang, Houliu and Qingmuchuan in southern Shaanxi are comparatively analyzed. The main focus of the comparison is on historical and geographical conditions as well as spatial patterns.

2. Google Earth Pro Software Overview

The software, which was launched in 2005, deploys aerial and satellite photographs of the earth on the same three-dimensional globe model in order to quickly
acquire clear remote sensing images with high resolution and a strong visual experience. At present, Google Earth Pro provides high-definition images covering most areas of China. It can quickly obtain geographies, architectures, environments, and traffic data on any spot of the globe by searching for place names. The image can be scaled to obtain different areas. Any three-dimensional data can be measured in real time. Additionally, many big cities also have a 3D street view mode, which allows one to intuitively observe the regional environments through perspective switching, tilting, and rotation, as if one were immersed in the environment. The traditional field survey method is time-consuming and labor-intensive. It is difficult to see the overall scope of the survey area for lack of a holistic view, and the measurement data are cumbersome. However, it can easily be completed by Google Earth Pro on a computer with Internet access. It is more important to note that the Google data and methods are more accurate and efficient than traditional methods.

First of all, Google Earth Pro supports map scaling well, while maintaining good resolution. Also, the window screenshot can be saved in real time. In addition, Google Earth Pro is faster and more reliable than other satellite map software. Many satellite images from some traditional software are not real time and differ to the actual ground conditions. Finally, Google Earth Pro also has some subsidiary functions that other software does not have. For example, when you adjust the time progress bar, the satellite images from different periods can be retrieved and used for comparing spatio-temporal differences and provide an ongoing analysis of the changes over times in the location.

There are many rivers in southern Shaanxi. Most of the ancient towns are located along the river. In this study, three typical ancient towns with high popularity and close relationship with the river are selected for analysis: Qingmuchuan, Fenghuang and Houliu. They also have the characteristics of traditional southern Shaanxi towns, but each has a completely different layout, space and structure [1-4]. The comparative findings of this research provide valuable information that can be used to preserve the natural environment and features of similar ancient towns [5].

3. Ancient Towns Overviews

3.1 Historical Evolution of Ancient Towns

The ancient town of Qingmuchuan has a long history. It can be traced back to the Spring and Autumn Period (770 B.C.-476 B.C.) and the Warring States Period (475 B.C.-221 B.C.). Before the Ming Dynasty (1368-1644), it was under the jurisdiction of Sichuan. After the early Ming Dynasty, it was placed under Shaanxi Province. During the Qing Dynasty (1636-1912), it was named “Qingmuchuan” for the local Daqingmu tree and the Jinxi River (Fig. 1). The ancient town is in the crossing zone of the “Bordering Three Provinces (Ningqiang County is located in the southwest edge of Shaanxi Province)”, connecting Gansu in the north and Sichuan in the west. The distance from Ningqiang County is about 115 km. The special geographical position of Qingmuchuan has always been the ancient battleground of the military. As a result, Qingmuchuan was in a state of war for a long time. After Futang Wei (1902-1952) came to implement autocratic rule during the early period of the Republic of China, Qingmuchuan gradually got out of the war and strife. Since then, Qingmuchuan has had little contact with the outside world, has been in a semi-closed state, and has gradually been transformed into a peaceful and beautiful paradise. Because of this, the local landscape styles and ancient buildings are still preserved.

Unlike the ancient town of Qingmuchuan, Fenghuang was known as the “the Fortress of Qin (768 B.C.-207 B.C.) and Chu (1115 B.C.-223 B.C.)” and is closely linked with the outside world. It used to be an important transportation hub leading to Chang’an which is named Xi’an at present. It is about 45 km away from Zhashui County which is located in the west
of Shangluo, Shaanxi. The ancient town of Fenghuang was built during the Tang Dynasty in 624 A.D. It has a history of about 1,400 years. As early as the Tang Dynasty (618-907), there were ancient markets. During the Qing Dynasty (1644-1911), a large number of merchants from Guangdong, Zhejiang, Shandong, and other places took their business and settled here. The ancient town gradually developed. In the late Qing Dynasty and early Ming Dynasty, Fenghuang became a thriving town, important for its business and trade. All kinds of shops and local banks populated the busy streets. However, with the decline of water transport in the 1930s, Fenghuang began to lose its former prosperity. Nowadays land transportation has replaced traditional water transport, except as a tourist attraction, because it is more efficient for the nearly 18,500 residents of the town.

Like Fenghuang, Houliu also experienced a period of prosperity in the past due to water transport but it is currently not prospering because the water system is now antiquated. Houliu dates back to the Neolithic Age. It is at the intersection of the Han River and the Zhongba River in southern Shiquan County in Shaanxi and is about 20 km north of the county’s political center today. Many stone tools, including axes, were excavated from the ground in the Eight Acre Field which is the Neolithic Age site on Xia Street in Houliu. In ancient times, the developed water transport made the town a commercial port and a hub for water transportation known throughout the coast of the Han River for over one thousand years. During the Ming (1368-1644) and Qing Dynasties (1644-1911), more than ten workshops were built in the waterfront area for manufacturing Tung oil, which is extracted from the Tung tree and widely used in architecture, printing, engineering and other industries. In ancient times, more than 10 tons of Tung oil was transported daily to Sichuan, Hubei and other places. Due to the large number of utensils needed to hold the oil, the local bamboo weaving industry was developed immediately. As time went by, the once developed water transport gradually declined. The total population of the ancient town has now reached more than 10,000.

3.2 Analysis of Geographical Environment of Ancient Towns

The first step is searching for the name of each ancient town to obtain its location using Google Earth Pro, and then getting the remote sensing satellite images of it [6]. By using the mouse to adjust the angle, the status of the three-dimensional terrains around the town can be directly seen, different layers can be opened, and one can also learn about the surrounding terrain, roads, place names, buildings, etc. After the above steps, the three-dimensional terrain images of the ancient town can be obtained.

The first ancient town is Qingmuchuan (Fig. 1). By zooming out and opening the boundary layer, one can see that Qingmuchuan is located in the hilly area of the intersection of Shaanxi, Sichuan and Gansu, near the upper reaches of the Jialing River. It is located on the flat land between two mountains and one river. To the north is Phoenix Mountain, to the south is Longchi Mountain, and between these mountains are the Jinxi River and Yuquanba River. The two rivers divide the ancient town in half. The residents live by the river.

Similar to Qingmuchuan, Fenghuang (Fig. 1) is located in a valley surrounded by mountains, where there are river runoffs. The difference is that Fenghuang is not divided in two by the river, but is situated south of it. The ancient town is backed by the Daliang Mountains and faces Fenghuang Mountain. The two face each other across the water and cause an echo. It is said that it is a place where “mountains and waters gather together”. The advantages of the geographical conditions allow the town to resist cold winter winds and enjoy cool winds in the summer with good sunny conditions. In addition, Shechuan River, which flows through the area, brings abundant water resources and lush vegetation to the ancient town. The unique ecological environment and comfortable
climate have caused local agriculture to develop rapidly.

Houliu is located between mountains, and is bordered by more of the rivers than the other two towns (Fig. 1). It is located not only on river terraces, but also is surrounded by water on three sides [7]. Because of its diverse topography, there is much variety in the landscape and many vivid living spaces. The overall terrain of the ancient town is high in the northwest and low in the southeast. The residents prefer to live on the higher areas on the slopes. Houliu is a good example of this old Chinese saying, “The water is shaped by the mountains, and the mountains are bounded by the water”.

4. Comparison and Analysis of Spatial Forms

4.1 The Comparison of Overall Layouts

Adjusting the Google Earth Pro satellite image to the top view angle and making the image closer to a flat map, makes it easy to observe the whole spatial pattern of the ancient town [8-11]. From Fig. 2, it can be clearly seen that Qingmuchuan is divided into two parts by the Jinxii River which runs east-west through the town. The south bank is the old district which was constructed along the Huilongchang Old Street, and the north bank is the new district of the town. These two parts are connected by bridges. It is not difficult to see the difference between the two sides from the image. The pattern of the old district on the south bank is more natural and soft. It is arranged in an S-shape, each space has own rhythm and feel, and the architectural style flows seamlessly. The buildings are unified by dark grey roofs that form a lot of courtyard architectural spaces. The roads in the new district are mostly in a straight line, and the buildings are constructed in groups, which is the typical modern layout style. The contrast between the two sides is very distinct.

Different from Qingmuchuan, the new district of Fenghuang (Fig. 2) is constructed around the ancient town. Streets and lanes were developed along the original ancient streets, so the boundaries between old and new districts are blurred, and they are not divided by the rivers. Both of them are on the south side of the Shechuan River. In Fig. 2, the darker areas where the architectural style is more uniform are the main core streets of Fenghuang. The lighter color area is the new town district, which has formed the spatial pattern of the juxtaposition of the new town area and the old town area.

Houliu is thriving because of water transportation (Fig. 2). The water environment advantages of it can be clearly seen in Fig. 2. The Han River in the east and the Zhongba River in the south have river spans ranging from 120 m to 350 m. The character of this town is obviously different from Qingmuchuan and Fenghuang. The core buildings of the ancient town are arranged in an orderly manner along the banks of the river. Limited by the slope-like terrain to the southeast, the new town area can only develop to the northwest. The layout of streets and lanes is free style, combined with relatively straight main roads and more twisted auxiliary roads. The roads between the new district and the old district are interconnected to form several loops.
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Fig. 2  The satellite image of three ancient towns. Diagram by the authors (2018).

4.2 The Comparison of Street Texture

Adjusting the original satellite image to the black and white base map makes it easier to see the texture of the ancient town [12, 13]. The prominent white lines are the streets in the ancient town. Like the layout of the new and ancient towns, the textures of streets and lanes on the south and north sides of Qingmuchuan (Fig. 3) also differ significantly, and are in stark contrast to each other. The southwest side of the ancient town is affected by mountains and rivers, so the main streets on this side form a curve around the mountains and the river, which is similar to the shape of a dragon, and hence the name is “Hui Longchang”. And nowadays this place is the central part of the old town area in Qingmuchuan. The ruler tool measurement of the length of the main street is about 600 m and the width is between 3-6 m. Two lanes penetrate and divide the main street into three sections: Shang Street, Zhong Street and Xia Street. Among them, Xia Street has existed since the inception of the ancient town of Huilongchang. The quality of the living space is the best in this area; however it is only suitable for residential uses. Zhong Street was a political, economic and entertainment center in ancient times. It was the most prosperous and concentrated area in the ancient town, and also the most lively area with the most complex functions. Shang Street is a continuation of the main street, connecting the interior and exterior spaces of the main street. The new town area and the ancient town area are connected by bridges. In comparison, since the new district does not have sharp changes in the topography and terrain, the whole area has a gentle flow to it. The streets did not have to be laid out along the terrain, but simply needed to satisfy the basic functions. Therefore, most of the buildings are group-type enclosures, with straight lanes interspersed between them to form a straight texture.

The overall texture of Fenghuang (Fig. 3) is more complex than Qingmuchuan [14]. There is no clear line between the new town area and the ancient town area; the two are connected together through the small and large branches of the main streets interspersed between them. The ancient streets are also affected by the topography and terrain, with many twists and turns. There are a number of obvious turning points and a large number of branch lanes, and each node is closely connected with obvious continuity. The length of main street is 700 m, and the width is about 4-5m, which is longer than that of Qingmuchuan. Among them, nine lanes are inserted, the widths of which are about 0.8 to 1.3 m. They are Citang Lane, Ma’an Lane, Kejia Lane, Spring Lane, Water Lane, LuJia Lane, ChenJia Lane, MengJia Lane and Kangning Lane. There are many transitions between these lanes and main streets, which divide the blocks on the plan layout and enrich the space in order to make the main street more lively and interesting. The streets and lanes of the new district in Fenghuang are mostly a continuation of the old district and are connected with other main streets of the new district to form a ring-shaped road. The main street of the new district is a two-way road along the Shechuan River.

Houliu (Fig. 3) was developed later than Qingmuchuan and Fenghuang. It has a more natural and curved
street texture. Different from the former two towns, Houliu is surrounded by water on three sides. The inner lake loop road was formed in the waterfront area. In general, the town radially extends to inner land and has the ancient waterfront pier in the southeast as its base point. The length of main street is only 220 m, so there are few branches and the width is about 3m. Walking along the ancient street, one can go directly to the ancient waterfront pier, which is the original birthplace of the civilization for this ancient town. It is also the most lively area in the town. The length of waterfront road is about 1 km, the width of which has been extended to 6 m. In the vicinity of the new town area of the old district, the ancient street line continues and diverges to the north and the west. The natural bends of the terrain form places where there are few buildings. The areas containing high concentrations of buildings with many floors are in stark contrast to the ancient district. The roadways are in a straight geometrical structure and densely connected to each other to form a grid. This texture is similar to modern cities.

In general, the overall texture of the modern streets of Qingmuchuan is the straightest and clearest, and the texture of the ancient town area is softer, but it is less connected with the new district. The texture of the streets in Houliu contains many curves, but there is a big difference in the relationship between density and linearity in the new district and the old district. However, Fenghuang has the most natural and harmonious texture; the new streets retain the old streets’ texture, which is in harmony with nature.

4.3 Comparison of the River Zones

The photos of various places within the view area can be found by opening the Panoramio view in Google Earth Pro [15-18]. Although current technology does not provide street views of these remote areas, the photos we get from the Panoramio view compensate for the deficiency of two-dimensional plan layouts. The Panoramio view’s remote sensors give us close-ups of particular locations in the structure of the towns and help us to analyze the spatial structure of the towns. However, some of the Panoramio photos were changed after November 4, 2016, and many old photos were deleted. Only a few scenes of the three ancient towns were retained, and the architectural decoration, landscape elements, and other details still need to be field investigated and photographed for details.

The difference in their location makes the interfaces along the rivers of these ancient towns distinct from each other. Among them, Fenghuang lies at the junction of the three rivers. Because of the significant change in the river water level over time, the influence of the rivers is the greatest in Fenghuang. In order to ensure the safety of the town during flood season, the ancient area of the town not only maintains a safe distance from the rivers on the plan layout, but also uses vertical dams to isolate the town from the rivers. As a result, in this ancient town the land along the river is only slightly accessible, and the stream is almost invisible in this area.

In contrast, the Jinxi River, which is close to Qingmuchuan, is relatively safe. During the flood
season, there is almost no negative impact on the lives of residents in the town. Therefore, the township faces the Jinx River, and the new district even has a commercial street along the river. With bridges spanning the river, the overall view is much more charming than Fenghuang.

Compared with the former two towns, Houliu has the largest area of water surrounding it. The town faces the Han River, an important tributary of the Yellow River, whose water level fluctuates greatly. Therefore, it is the most closed of the three ancient towns. However, the area along the river in Houliu is particularly open, which is due to the slope-type terrain of the ancient town. The land of the ancient town was built up so its height is far enough above that of the Han River to form a natural safety gap. This natural layout precludes the need for vertical dams, which would obscure the view. And the use of slope-oriented dams in the lower part of the terrain makes the ancient town appear more picturesque.

5. Comparison and Analysis of Architectural Style and Features

Although the Panoramio layer provides valuable field photos, it does not show all the details. Since the research requires an in-depth analysis of the architectural aesthetics and artistic features of the towns, it is necessary to conduct a field survey based on the images provided by Google Earth Pro. This research also contains the results of several investigations of these ancient towns and completes the study of their architectural style and characteristics through close-range observation and analysis [19-22].

5.1 Comparison of Architectural Forms

From the perspective of the overall form of ancient dwelling houses, the three ancient towns have obvious characteristics of traditional dwellings in southern Shaanxi. First of all, the structural building materials are masonry and wood, and the “column and tie construction” and the “post and lintel construction” are the most commonly used styles. The frame is made of wood columns, and stone is used as the foundation under the columns. Secondly, the overall color of residential buildings is simple and elegant, with no added decoration; mainly white, gray and earth colors are used, keeping an authentic sense of the material’s texture. Finally, the homes are made up of square courtyards surrounded by four buildings; most with two or three courtyard areas lined up in a row, with wealthier families having more space. Each courtyard is surrounded by four structures with entries along a center axis. These special patio spaces are designed to adapt to the hot and rainy climate in southern Shaanxi. The wide eaves around the building are used for shading. The sloped roofs angling into the courtyard from all four sides are used for rapid drainage on rainy days, with rain falling into small trenches lining the patio’s four sides, keeping the brick/stone ground cover dry. This scene is called “four waters return home” in Chinese, meaning “water, representing wealth, from four directions returns to the home, bringing good luck”. Normally, the front part of the courtyard is used as a store business and the back part is for residential use. Of course, there are alternate styles, such as the whole first floor being used for business and the second floor for residential use.

The difference between the towns is that Fenghuang is influenced even more by the Chu culture (culture originated from Chu state in the Spring and Autumn period of China, an important part of the Chinese civilization), and the architectural style of the Huizhou (which is located in Huangshan City, Anhui Province, one of the three birthplaces of Chinese Regional Culture) is more obvious. The rich and delicate brick and stone sculptures, wood carvings, and the ethereal “horsehead” (an overhanging eave with decorative animal stone carvings), reflect the “Hui” style of architecture, which is found scattered throughout southern China and is most known for its “horsehead” decoration. The “horsehead” walls in the old town of Fenghuang are mostly double-stacked, with a complex
brick pattern, which has a unique dynamic beauty and improves the inherent shape of the horsehead walls. In addition, the architectural tone of Fenghuang is grayish, while the folk houses of Qingmuchuan and Houliu are whiter, and similar to each other. In terms of type of architecture, the buildings in Qingmuchuan and Houliu are designed with a south-facing layout on the waterside area. The structure is raised from the ground, effectively moisture-proofing for the home for residential use. In contrast, Fenghuang houses are separated from the river and seldom face the water directly.

5.2 Comparison of Architectural Structures and Decoration

Affected by the region’s culture, the three towns have integrated the features of north and south China in the building structures. Both the column and tie construction structure in the north and post and lintel construction structure (Fig. 4) in the south mentioned above can be seen in the residential buildings, often combined to form a “interspersed girder structure”. This structure places the purlins directly on the beams, and then the columns are connected with each other by penetrating ties (Fig. 4). After three intersecting components, the structure reaches the roof surface to form an integral timber frame. Different from the conventional “column and tie construction”, center pillars do not extend to the ground in order to form an open living space. The masonry-built walls are very common, utilizing the heat storage capacity of the masonry to ensure that it is warm in winter and cool in summer. In addition, there are rectangular-shaped wood panels set into the wall forming windows and doors, which are easily opened and closed, often used in street shops.

The architectural decoration of Fenghuang is the richest, most exquisite, and diverse with three kinds of forms, including wood carvings, brick carvings, and stone carvings. Wood carvings are mainly used for doors, windows and furnishings. Brick and stone carvings are used for roof ridges and column bases. Most of the carvings depict stories of animals, plants, and characters that symbolize good luck in the local traditional culture. For example, the peony symbolizes wealth and good fortune. The dragon, phoenix, and unicorn symbolize auspiciousness. The magpie, plum, bamboo, pine and orchid also symbolize good luck. These carvings are meticulous and of great artistic value. Even the column base, which is seemingly the simplest part of the column design, may have a square shape, a hexagon shape, a circular drum shape, etc.. By contrast, the decoration of the other two ancient towns is more rustic and natural.

In Qingmuchuan and Houliu, seemingly simple stone steps are used extensively, yet the technique is quite elaborate. The bottom of the stairs and the top layer are neatly paved with blue stones. The middle layer is arranged with vertical cobblestones, giving it a natural, rustic flavor. The same effect is produced in building interiors, such as wooden frames, railings, and

![Diagram by the authors (2018).](image-url)
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Fig. 5  The type of column base. Diagram by the authors (2018).

|                      | Qingmuchuan                                                                 | Fenghuang                                                                 | Houliu                                                                 |
|----------------------|-----------------------------------------------------------------------------|---------------------------------------------------------------------------|------------------------------------------------------------------------|
| Geographical conditions | Situated between two mountains, the town has a river running through it.    | Surrounded by mountains, the town has a large river running along its north border. That river is intersected by two small rivers on the west end of town. | Surrounded by mountains, the town sits on the banks of two intersecting rivers.  |
| Overall layout        | The new district and the old district are separated by the river, giving both districts access to it. | The old district is surrounded on three sides by the new district, which separates it from the river. | The old district is surrounded on three sides by the river, with the new district expanding inland. |
| Street textures       | The streets in the new district are straight and those in the old district are naturally curved; differences between the two are obvious. | The new district’s streets continue the curved structure of the old district’s streets in a coordinated overall layout. | The new district and the old district are totally different in density and linear relationship. |
| Accessibility to the river zones | Strongest                                                                | Weak                                                                     | Strong                                                                  |
| Architectural forms and structures | Most of them are enclosed courtyard-style residential buildings with brick-wood structures and timber frames which are a composite of the “Cross-bow” and “Girder-bearing” styles. | Diverse and exquisite                                                    | Simple and neat                                                           |
| Architectural decoration | Simple and neat                                                           | The old town is being swallowed up by the new town. Measures should be taken to protect ancient buildings, and ordinances need to be enforced regarding new construction. In order to enhance the natural feeling and openness of the ancient town, access to the river needs to be restored to the old district by adding pedestrian lanes along with green spaces for public use. | The original buildings of the old district are arranged in an orderly manner that is harmonious with nature. However, the concrete paving at the waterfront is too severe and conflicts with the natural landscape. It is recommended that the original ecological landscape elements be properly restored at the waterfront. Guidelines for new construction should deliberately focus on building in the same style as the ancient buildings. |
| Analysis              | The complete separation of the new district from the old district by the river provides a natural protection. However, the features of the new town area should be integrated with the features of the ancient town area to avoid excessive urbanization. |                                                                                    |                                                                                                   |

handrails in the folk houses of Qingmuchuan. All of these are painted with earthy colors, rather than bright lavish colors, to protect the timber. These concise and plain features work together to make a simple, unpolished appearance.

These three towns are representative of the ancient waterside towns in southern Shaanxi. However, they are totally different from each other in street textures, spatial patterns, and architectural forms, owing to the differences in the surrounding natural environment.
Google Earth Pro conveniently facilitates analysis not only of the large-scale overall environment and spatial structure of the three ancient towns, but also provides local photos for detailed comparison. The specific results of this investigation are shown in the following table (Table 1).

6. Protection Strategies

Considering the above observations, six recommendations can be put forward:

(1) The natural landscape and elegant atmosphere of the ancient towns should be protected. The layout of the new town’s street texture should be coordinated with the pattern of the ancient town. In addition, we should formulate protection plans for the core protected area (old towns); the construction control area (landscaping between old and new towns); and the integration area (new towns). The street lane texture, ancient residential buildings, and landscape environment should be strictly protected.

(2) The development of the town should be strictly controlled. The old town area and the new town area should be separated by green space and there should be access to natural water systems (such as canals, lanes leading to the river, etc.) in order to coordinate the style and function.

(3) Attention needs to be given to protecting and renovating historical buildings according to the standards of cultural relics. New buildings should adhere to pre-determined style codes which form a more unified impression.

(4) The infrastructure (including plumbing, waste treatment, garbage disposal and electricity) should be optimized to meet ecological specifications, which will improve living conditions. This should be paired with educational initiatives that will encourage the residents to protect their cultural heritage.

(5) The natural landscape area should be protected for public use. Planting local tree and flora species will strengthen the green ecological environment [23-26].

(6) The development of tourism should be managed to protect the original flavor of the local culture, avoiding artificialization and commercialization that have a negative impact on the ancient town [27].

As our national treasure, ancient towns are worth preserving. We can never recapture our nation’s historical architecture once it is gone. However, how to continue the traditional landscape style and coordinate the relationship between the new town area and the old town area has become a new problem in the protection work. Over-urbanization and unnatural, artificial looking design are the common problems in many ancient towns. Therefore, the waterside ancient towns should have their own distinct characteristics and more attention should be paid to the openness and ecology of the waterfront landscape. It is also important that the integration of modern landscape elements and traditional primitive elements be addressed [28-30]. Finally, we hope that the waterside ancient towns will receive more relevant professional attention and support in order to keep pace and continuously improve with the times.

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