

Suburban Composite Landscape Corridor Design Based on “Flow” Concept in Dinghai District of Zhoushan

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Abstract: Dinghai district, the central area of Zhoushan, Zhejiang Province, lies on the biggest island of Zhoushan Archipelago. Owing to its marvelous island feature, Zhoushan has been attracting more and more people to Island Tourism, Agricultural Tourism and Culture Tourism. Shuangxiao Road is a transportation line through suburban area connecting the south to the north. However, the vicinity of Shuangxiao Road fails to afford the comprehensive suburban function to coordinate urban areas with rural ones. This paper holds the opinion that Shuangxiao Road should not be treated as a road with only transportation function, but also a composite corridor and should play an important role in integrating urban and rural areas on landscape. Also, the concept “Flow” explains the crucial role of landscape corridor in suburban area. We investigate the situation along Shuangxiao Road and find out the superior resources, environmental problems and landscape potentials. Paying attention to important nodes and interfaces, with nodes renovation, facades reform and interfaces design, this paper tries to regenerate the existing corridor to a novel composite one. The composite landscape corridor not only improves the environmental conditions and conveys landscape features, but also enhances the integration of urban and rural areas.

Keywords: Corridor design, Dinghai district (Zhoushan), environmental problems, “Flow” concept, integrating, landscape potentials, resources, suburban composite landscape.

1. RESEARCH BACKGROUND

1.1. The Dialogue Between Urban and Rural Areas

Nowadays, China has been on the middle phase of its industrialism and to some extent has the ability to apply the advantages of industry to support the development of agriculture. Also, with rapid industrialism and urbanism speed, China sets out to promote the conditions in rural areas by using urban resources of economy, technology and material, *etc.* [1]. During these years, some policies have been put up to demand the integration development on urban and rural areas [2]. This means the urban and rural areas should have equal status compared to the unequal ones in the past development mode to obtain mutual benefits today and in future. The integration development in urban and rural areas provides a great chance for the dialogue between urban and rural areas and it can eradicate the defects in binary system, in the economic and social structure, *etc.* It pursues the balance between human and nature, the harmonious development between economy and society and aims to achieve the final integration of urban and rural areas [3]. In the dialogue between urban and rural areas, the very important link will be the open way and the fluent communications. Suburban areas will play a crucial role in the dialogue. The open on urban and rural areas requires that various resources can go through the suburban areas without any obstacles in order to achieve a more reasonable resource allocation and enhance the integration development in both urban and rural areas.

The conception of suburban composite landscape corridor comes into being with the very background mentioned above. The corridor is considered as a linear functional space with composite functions. The concept of “flow” is put up and it is believed that the composite landscape corridor will realize the fluent movement of “flows”. This will provide the impulse in the dialogue between urban and rural areas.

1.2. The Requirement of Sustainable Development

Usually, people keep a wrong opinion that industry should develop more rapidly in rural areas to pull the economy development in order to narrow the social gap between urban and rural areas. However, environment and culture are easily ignored in this mode. This issue puts forward that regional environment, ecology and landscape feature (natural and cultural landscape in the very suburban settlements) should be respected and reserved during the economic development. Owing to the great value of ecological resource, western countries have focused on the “greenway” research since last century and this will enlighten researchers in China to some extent [4-6]. It is thought that “greenway” is a linear land use system and a sustainable land use mode, which has ecological, entertainment, cultural and aesthetic function [7]. The composite landscape corridor should also have more functions (ecological, cultural, *etc.*) than the only basic transportation function for urban and rural areas [8, 9]. This view will be discussed later in this issue. The maximum composite of different functions conforms to the requirement of high efficiency from the sustainable development which is one of the core arguments in the issue.

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2. THE PRESENT SITUATION OF DINGHAI DISTRICT AND SHUANGXIAO ROAD

Zhoushan Archipelago is the largest Archipelago in the coastal areas of China. It lies in the northern sea of Zhejiang Province, south to the Yangtze River estuary and east to Hangzhou Bay. Zhoushan Island is the largest of islands that is located in the southwest with 502.65 square kilometers and it is also the fourth largest island in China. The middle and western parts belong to Dinghai District, which is politics, economy and culture center of Zhoushan City. Its industry is well-developed, including machinery manufacturing industry, food and clothing industry and shipbuilding industry, *etc.* This case is mainly on Shuangxiao Road lying in the west of Dinghai District (Fig. (1) and (2a)). Jinying industry area, the key industry base, lies by Shuangxiao Road. However, the industrial level in areas with more natural landscape and rural features around Shuangxiao Road is rather low. Owing to Dinghai's marvelous island feature, the island has been attracting more and more people who are interested in Island Tourism, Agricultural Tourism and Culture Tourism. But the vicinity of Shuangxiao Road, the suburban area, fails to afford the comprehensive suburban function to integrate urban areas with rural ones (Fig. (2b)).

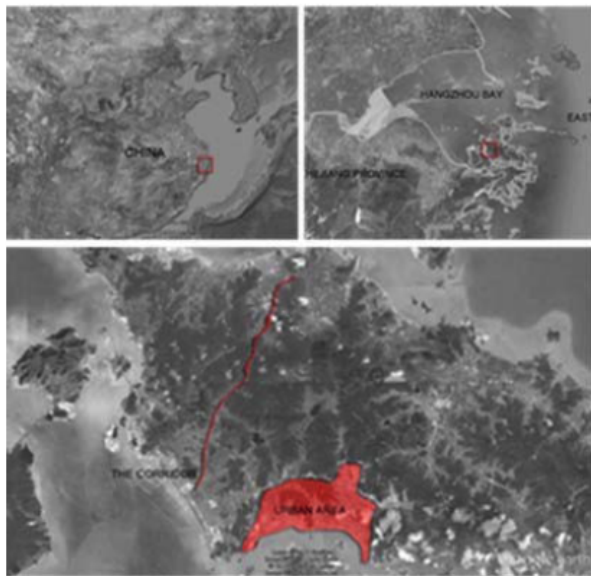


Fig. (1). The location of Shuangxiao Road in China.

Suburban area, which has not got a uniform definition, is usually recognized as the zone where industrial, population and spatial structures gradually transit from urban features to rural ones. Suburban area, the vicinity of Shuangxiao Road in our case is mainly defined by its location. Though it is very close to urban center and defined as suburban area, more of its features are rural landscape, with little industry and commercial areas. This type of suburban area is studied in the issue. We research the composite landscape corridor in the suburban area type, trying to take active modifications to reserve and convey their natural and cultural feature to people who are devoted to develop the industry in suburban area. This corridor should also play a crucial role in integrating urban and rural areas and providing a landscape guide for tourists, even protecting natural resources in the future.

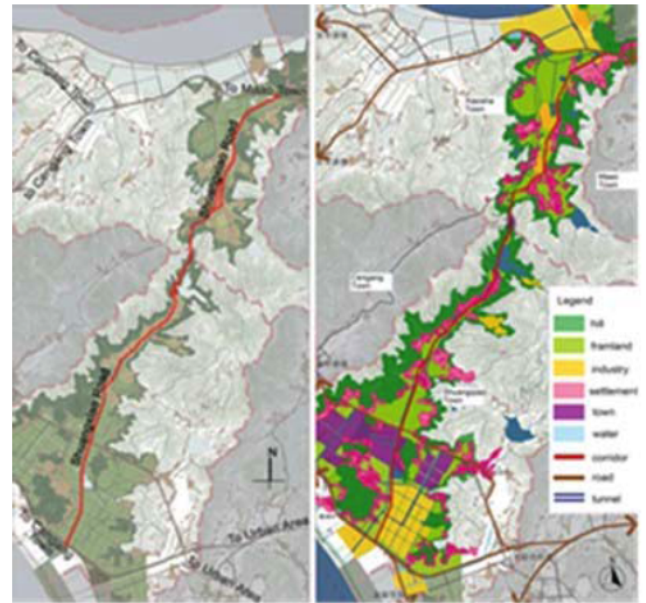


Fig. (2a). The situation of Shuangxiao Road (left).

Fig. (2b). Future planning for Shuangxiao Road with more industry areas (right).

3. “FLOW”: SHUANGXIAO ROAD AS SUBURBAN COMPOSITE LANDSCAPE CORRIDOR

Shuangxiao Road as a suburban composite landscape corridor has the basic transportation function, and then the function expresses natural and cultural landscape. At the present time, Shuangxiao Road, even the suburban area fails to afford the role in urban and rural integration development. During the study, we decide to give up the blind research on the various and complicated interactions from different forces. Therefore, considering both sides of urban and rural areas, we put forward the concept: “Flow” to figure out the role of suburban area.

3.1. What is “Flow”?

There are many kinds of “flow”, such as material flow, ecological flow and cultural flow, *etc.* They convey the energy or information between urban and rural areas. From urban to rural areas, there are more flows on material, economy and technology. These flows show that the advantages in city have a great effect on rural life. On the contrary, from rural to urban areas, apart from agricultural products, the flows are on ecology, natural landscape, settlement's cultural landscape, *etc.* Those suggest that rural lifestyle attracts urban people and tourists.

3.2. What is the Corridor's Meaning Under the “Flow” Concept?

All flows going through suburban area need a passage, and the composite landscape corridor is taken as the passage for different flows. The corridor conveys flows. For example, the road itself transports material flow between urban and rural areas and the natural landscape on both sides conveys green flow to people. The composite corridor can be treated as a composite space, and people will experience flows through different elements in this space which we will discuss later. That is to say, the corridor is not only the pas-

sage for flows, but also the part of flows while they are going through.

3.3. The Flow of Natural and Cultural Landscape

In this case, Shuangxiao Road is the main trunk connecting urban to rural areas. It is also a necessary part in different systems in relation to urban and rural areas:

The network system of industry and economy

The organic circulation system of landscape

The coordinated cultural system

Therefore, Shuangxiao Road affords the conveyance of flows in different systems. Since Zhoushan attracts people for its Island Tourism, Agricultural Tourism and Culture Tourism, the important role that Shuangxiao Road plays in conveying natural and cultural landscape flow is studied in this issue.

4. THREE FACTORS AFFECTING COMPOSITE LANDSCAPE CORRIDOR

Usually, suburban landscape is separated by roads. In composite landscape corridor study, however, suburban landscape can be integrated as a whole. As discussed above, the composite landscape corridor can be treated as a composite space and people's experiences vary when some factors change. There are three factors affecting composite landscape corridor:

4.1. Road Characteristics of the Corridor

Road grade of the composite landscape corridor decides its flow-ability. Not all the roads in suburban areas are studied in this issue. The selected road such as Shuangxiao Road has the very characteristics: the road grade is obscured and it has different transportation types. For example, there exist fast motor vehicles, slower bicycles and pedestrian in the same road. Such road is open enough to different uses so that it will fully convey various experiences to people on landscape flow.

4.2. Three Landscape Experience Types

When corridor conveys landscape flows, it has influence scopes. In suburban area with different regional features, landscape cannot keep the same. Relevant to influence scopes, the landscape experienced by people has three types: short-range landscape, mid-range landscape and long-range landscape. Therefore, People can feel different influence from landscape flow. The first scope is short-range landscape which is also the nearest to people. It includes the greening along the road and some building that can be seen very clearly. Those can all impress people very much. The second scope is mid-range landscape which can lead people to a little further area, and it must be identifiable and attracting because of its influence on leading effect. The third scope is long-range landscape which is so obscured that it is usually ignored by people. Even though, it is a foil to the other landscape.

4.3. The Nodes and Interfaces

The landscape flow's influence does not remain the same through the whole corridor. Because only the short-range

and mid-range landscape can be modified, we bring out two important elements of them: nodes and interfaces. The landscape flow is hard to be calculated numerically in the moment, but it can be experienced by the form and image of space. Nodes are the spots where flow converges or changes. There are different nodes with functional, natural or cultural characteristics. Nodes must be designed according to their exclusive situation on greening, architectural space and signs, etc. As people are moving in the corridor, the landscape flow seems to be continuous. Therefore, interfaces refer to a section of continuous landscape. The pattern of settlements and the layout of resource will be involved. Landscape flow changes in nodes and continues along interfaces, which makes the corridor rhythmic and well-organized.

5. THE REFORM DESIGN FOR THE COMPOSITE LANDSCAPE CORRIDOR

Shuangxiao Road and the suburban area are parts of the project named "The Planning and Construction of Beautiful Zhoushan Island" founded by Zhoushan government. We investigated this area on resource allocation, settlements construction and landscape features. By using the conception of composite landscape corridor, we complete the reform design for Shuangxiao Road and its vicinity.

5.1. Resource Situation

On both sides of Shuangxiao Road, most of the area is farmland full of woods, water, hills and rural settlements. There are grapes, citrus, rice plants and so on. Besides, the key industry area named Jinying Industry Area lies in the northern part of the line whose vicinity locates commercial streets. The culture resource is mainly marine culture. There are still some temples and ancestral halls in settlements which became important meeting space and entertainment space. People can communicate with each other there. The resource situation means a lot to mid-range landscape, and it will attract people to explore the inner places (Fig. (3a)).

5.2. Problems

We analyzed the superior resources in the whole line and marked them out (Fig. (3b)). Furthermore, we found out the problems in the area.

The road: there are few lighting facilities through the entire road and there seems to be no management of garbage.

The building: Some illegal buildings lie along the road. Old buildings and the new ones have nothing in common in style. Some landscape places lack identification and unity. Some structure foundations in the farmland are in bad conditions.

The hill body: quarrying movements result in the damage of hill bodies and there is a risk of landslide disaster.

The water: ponds and streams along the line are slightly polluted. Some river banks have piles of garbage and lack greening.

The greening: there are no roadside trees and some places need greening design. What is more, the grape planting results in white pollution. Lots of plastic sheds are damaging the landscape.



Fig. (3a). The superior resources (left).

Fig. (3b). The problems we found in hill body, water, road, greening, building and identification system (right).

The identification system: there are not enough and clear signs for tourists and the identification parts are lacking for key industry and sightseeing places so that some valuable nodes are ignored by people.

5.3. Modifications

The road: Clear piles of garbage along the road and build garbage transfer station to enhance the management. As regards some places where the garbage cannot be removed, try to use greening to cover them.

The building: remove illegal buildings and reform structure foundations in the farmland to make them as great features.

The hill body: according to the characteristics of stones in the hill, rebuild the greening or use certain technology to make them delighting. Creating them as rock climbing park is also a good method.

The water: Diminish the pollution and keep water clean. Construct water-front walkway and enrich landscape on both sides.

The greening: Plant trees on both road sides and diminish white pollution. Referring to some places where people probably stay for rest, details on greening design are necessary.

The identification system: unify signs in the area and mark out crucial nodes and interfaces to make each key landscape place easily recognized.

Besides, the main culture resource is marine culture. As a result, temples and ancestral halls in settlements are important living space for residents. The culture space should not only be reserved, but also become a place carrying traditions of old generations. It will provide the spiritual heritage for residents and also be an attracting space for visitors. As

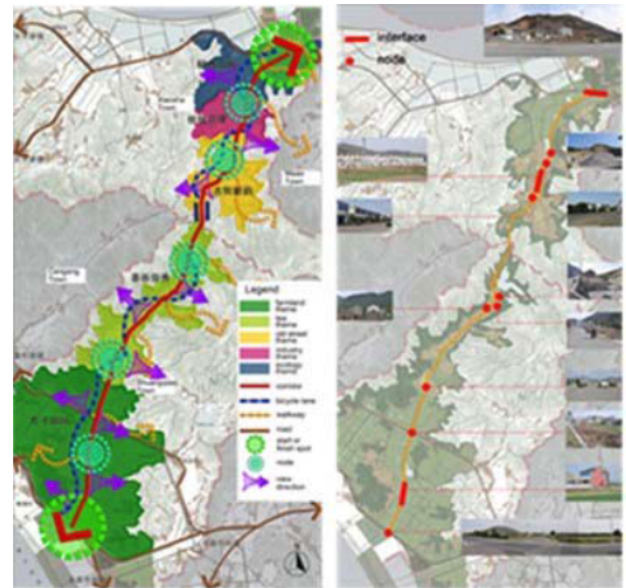


Fig. (4a). The structure of the corridor (left). The sequence is determined and every part has a main theme. It is the landscape guide for visitors.

Fig. (4b). Important nodes and interfaces are picked out (right).

to architectural form, respecting and integrating original ones should be identified in facade reform on buildings. Also, the landscape guide for visitors is determined by the structure design of the corridor, and it completes the corridor's sequence (Fig. (4a)).

Attention should be paid to keep the natural and cultural landscape flow fluent while it is going through corridor and make sure it is well conveyed to people. Therefore, we pick up the key nodes and interfaces (Fig. (4b)) which affect the landscape flow a lot (Fig. (5) and (6)).



Fig. (5). A typical interface reformed. The result is very clear by comparing the original image with the one reformed.



Fig. (6). A typical node reformed. The hill body is well repaired and becomes a pleasing place.

CONCLUSION

The construction on reform in the vicinity of Shuangxiao Road has already started and will be finished by the end of 2012. The composite landscape corridor will not only improve the environmental conditions in the whole district, but also enhances the connections among the urban, suburban and rural areas, which will finally impulse the economic development of the whole district and island. The study will help suburban areas with the same type as Zhoushan's which have low industrialization, lots of rural landscape features and great potential on tourism or sightseeing. The study will help them to reserve and convey their rural features while the industry is being rapidly developed.

CONFLICT OF INTEREST

The authors confirm that this article content has no conflict of interest.

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