

**Case Report**

Case Study on the Application of Agricultural Landscape at the Expressway Entrance of Hangzhou

Yang Wang¹, Lingzhi Shen¹, Yun Xie^{2,*}

¹Power China Huadong Engineering Corporation Limited, Hangzhou, China

²Jiyang School, Zhejiang A & F University, Zhuji, China

Email address:

xieyun@zafu.edu.cn (Yun Xie)

*Corresponding author

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Abstract: At present, under the new background of accelerating urbanization and deepening food crisis, agricultural landscape theory and its applications show great significance and practicality. With production value, leisure value and aesthetic value, agricultural landscape has unique value and effect on easing the conflicts between urban construction and agriculture, and promoting urban-rural integration. Here, the agricultural landscape space of three expressway entrances in Hangzhou was chosen to study. Then, the results showed that (1) the Zen Tea culture was integrated into the high-quality ecological terraced tea hill at Jingshan Entrance, which enables passers-by to appreciate the rich farming culture and Zen Tea culture the first time entering; (2) similarly, at Longwu Entrance which is characterized with the continuous tea hills, the designers emphasized the historical and cultural features of "Thousand Year Tea Town" by showing the tea culture, tea industry and tea life with elaborate landscape designs; (3) at last, a "rural-urban integration" landscape was presented at the Permaculture Park and the Welcoming Exhibition Area at the South Entrance of Hangzhou. In summary, introducing agricultural landscape into the expressway entrance not only creates a beautiful landscape space and an innovative cultural landmark with distinctive characteristics, but also grants the expressway entrance cultural, social and economic functions, and promotes urban-rural integration.

Keywords: Expressway Entrance, Agricultural Landscape, Landscape Diversity, Productive Landscape

1. Introduction

In 1902, British scholar Howard E came up with the concept of the "Garden City", which devised the novel combination of urban and rural space [1] "Garden City" gradually developed into the theoretical and practical exploration on agricultural landscape theory, agricultural urbanism, urban agriculture, agriculture parks and so on [2], such as the famous "Finger Plan" for Copenhagen where a large area of natural and rural areas have formed high-quality natural parks and agricultural area [3], the "Ring Plan" concept of Singapore, where ecological corridors and diverse parks connected 13 scattered towns [4]. And the ecological planning in the Barcelona metropolitan area utilizing agricultural parks and natural parks [5].

At the current stage in China, along with the rapid

expansion of urban space, the cultivated area is diminishing with each passing year, which forces us to ponder over food safety issues, that could be mitigated by more small-scale production of food in urban areas [6], such as the highway entrances. The Food and Agriculture Organization of the United Nations (FAO) are supporting many cities worldwide through the "Food for the Cities" and "Growing Greener Cities" initiatives, which has been estimated to involve 800 million people worldwide to improve the urban food supply, security and distribution [7], to provide more diverse and nutritious diet for urban citizens [8], The need for cities to become more sustainable systems of provision and consumption is widely acknowledged [9]. So it is of necessity for us to contemplate the relationship between urban planning and construction and urban agriculture and to reconstruct the relationship between urban and rural areas. As a result,

agricultural production and urban development can be combined in an organic manner in order to achieve “integrated urban and rural development”. Besides, agricultural production is introduced into urban areas, and thus urban agriculture system planning is included in the overall urban planning and becomes an integral part of it.

Located at the junction of urban and rural areas, the expressway entrance serves as the first significant landscape that showcases images of a city as well as its social and cultural information. Due to its most frequent flow of people, logistics, energy and information, the expressway entrance is considered as the most vibrant junction point in urban and rural construction. To be noted, the land condition of the expressway entrance is featured with complexity and sensitivity, since it not only possesses stretches of space for agricultural production, but is the key point of junction belonging to the urban green corridor system. Thus, a new, coherent, multi-functional and sustainable urban agricultural space can be created by constructing agricultural landscape at the expressway entrance and integrating agricultural production activities and rural landscape into the urban space system [10]. Therefore, it can be claimed that the expressway entrance is the preferred option of constructing “urban agriculture” [2]. Starting from the expressway entrance, agricultural landscape extends to the city in a wedge-shaped way, connecting the urban space and satisfying citizens’ demands on experience and production. Furthermore, the landscape can not only provide a food supply system nearby, but also shape the urban security pattern combined with the green space system [2]. Meanwhile, constructing agricultural landscape at the expressway entrance is favorable in terms of its fair practicality and outstanding display and guiding effects since it not only expands and enriches the conventional urban landscape, but also displays urban characteristics and culture, further promoting the development of urban agriculture effectively.

2. Relevant Theories of Agricultural Landscape and Their Application Status

2.1. The Concept and Theory of Agricultural Landscape

Agricultural landscape refers to introducing agriculture as a form of landscape into a city. During this process, crops are employed as the primary elements to build a landscape space with leisure value, production value and aesthetic value. Thereinto, agricultural production and management are intertwined with nostalgia culture, which supplies urban residents with spaces for recreation, participation, education, entertainment, fitness and other experiential activities in addition to agricultural products.

There are many theories in relation to agricultural landscape. (1) Theories such as edible landscape [11], agricultural productive landscape [12], agrarian urbanism and Continuous Productive Urban Landscapes (CPULs) [13] have been availed to explore the landscape values, ecological values and

economic values of agricultural landscapes in the light of urban landscape and urban space construction. (2) As for the researches on the science and technology, ecology, as well as tourism and leisure of urban agriculture from the perspective of agricultural production and food supply, theories of city and urban agriculture are mainly adopted [14]. In April 2012, the Ministry of Agriculture issued the Opinions on Accelerating the Development of Modern Urban Agriculture, which opens a new chapter on the national strategy of modern urban agriculture [15]. (3) Considering global biodiversity, studies on the close association between the ecosystem and the agricultural system mainly follow productive vernacular landscape theory, etc. In addition to provide fresh, local produce for urban residents, urban agriculture landscape may benefit biodiversity by decreasing the need to expand agriculture into natural areas as well as enhancing biodiversity in urban areas [16]. (4) Besides, it should be noticed that urban agriculture can sequester carbon of urban area [17], and in October 2010, the 10th Summit of the United Nations Convention on Biological Diversity (COP-10) launched Global Conservation of Traditional Productive Vernacular Landscapes Initiative [18].

2.2. Current Applications of Agricultural Landscape

In general, agricultural landscape is multi-disciplinary and forges ahead toward diversified and sustainable development. In this case, its application in the city has aroused extensive concern from people. At the macro level, many scholars have called for the integration of the agricultural system into overall urban and rural planning so that the agricultural industry not only merges into urban space configuration, but also overlaps with urban ecological barriers. At the micro level, a lot of attempts have been made. For instance, the progress of “buying local food” movement in foreign countries has spurred the development of agricultural landscape in cities. Besides, social entrepreneurs have capitalized on new ways to integrate agriculture into urban life, such as City Farms in Japan, Lufa Farms in Montreal, Canada, the Grow Up Box in London, UK, the Beacon Food Forest in Seattle and Washington, US, Brooklyn Farming in New York, and Urban Organics in Sao Paulo [19]. And more, park and recreation agencies and districts are operating farmers markets, home farms, the farming community, engaging youth in agriculture programs with preserving agricultural heritage, promoting conservation and providing education programming that reconnects urbanites with nature, and immersing visitors in the farm experience [20]. Agriculture landscapes are used in various levels, including farm market operating, home farm and community engagement and education, conservation of natural resources and the agritourism economy [20], which has become a popular and lucrative enterprise [21]. Almost 10,000 farmers markets are operating community engagement and education in the U.S. today. Farmers markets are becoming a mainstay operation for an increasing number of park and recreation agencies [20]. Such as Miami County Park District (MCPD) and Five Rivers Metro Parks (FRMP), that incorporate agriculture landscape into their programs,

preserving the agricultural heritage of the region [20]. And Columbia's Agriculture Park, that located on 10 acres of open space at the city's Clary-Shy community Park and serves as a community hub, education center and home to a covered, yearround farmers market, as well as complement the existing Activity and Recreation Center (ARC) [21].

In China, agricultural landscape in cities is mainly applied to eco-agriculture demonstration parks [22], urban memorial parks, street green area, office buildings, residential green space, wetland parks, "grey space" under the overpass, roofs of public buildings, etc, such as paddy landscape at Shenyang Jianzhu University and China Academy of Art, the Park of Site of Eight Diagram Field, Xixi Wetland, Yongjin Garden and Qiantang Plantations in Hangzhou. However, up to now, the application of agricultural landscape in the junction of urban and rural areas, namely expressway entrances, has not been reported. Undoubtedly, the expressway entrance is full of rural characteristics and also functions an organic component of a city. In a word, since the application of agricultural landscape can better highlight the identifying, cultural and ecological qualities of expressway entrances, and meanwhile demonstrate the agricultural culture and historical imprint of a city, it is of practical significance.

In Hangzhou, Zhejiang province, a comprehensive renovation project of city entrances was launched in 2015 for G20 Summit, with 31 expressway entrances in total being renovated and upgraded. During the renovation process, agricultural landscape such as tea plantations, was adopted according to local conditions, and then, the achievements were beyond expectation. Therefore, this research intends to conduct a case study on expressway entrances in Hangzhou so as to elucidate the application of agricultural landscape in expressway entrances, which is one of the highlights of agricultural landscape application, and thus is of significant referential meaning.

3. Case Study on Agricultural Landscape at Expressway Entrances of Hangzhou

Agricultural landscape has been applied to three expressway entrances in Hangzhou, thus not only showing the cultural history and farming culture of Hangzhou City, but also creating a high-quality space that is friendly, pleasant, simple and natural. To some extent, these landscapes symbolic of agricultural civilization have developed into new cultural landmarks for Hangzhou City, thus facilitating the integrated urban and rural development in an effective way.

3.1. The Construction of Agricultural Landscape at Jingshan Entrance of Hangzhou-Changsha Expressway

Located at the junction of northwest Hangzhou and Jingshan Town, Jingshan Entrance of Hangzhou-Changsha expressway is the northwest gateway of Hangzhou, the passage for Zen Lifestyle Town, a holistic and grand tour "Tourism Westward Movement" implemented by Hangzhou,

as well as a vital node of Jingshan Demonstration Zone for Holistic Farming and Tourism themed by "Tourism, Culture, Industry, Transportation, and Urban and Rural areas". When it comes to Jingshan, it is marked by the unique agricultural landscape resources, namely, large tracts of "low-rise mountains, gentle slopes and tea gardens in the valley" and is rich in cultural resources, including Wanshou Temple topping in the famous Five Mountains and Ten Temples, and the world-renowned The Classic of Tea written by Lu Yu who is hailed as the saint of tea. On this account, Jingshan Town decides to establish a national-level rural tourism network and sightseeing agriculture landscape featured by Zen Tea culture, so as to develop rural ecotourism.

Based on what has been mentioned above, the landscape at Jingshan Entrance is no longer confined to road greening design that is frequently employed in ordinary entrances. Instead, under the guidance of "resource integration, regional integration, and imitation of the nature" and against the backdrop of high-quality ecological terraced tea hills, the Zen Tea, landscapes, fields, gardens as well as bamboo are used as design elements to construct the agricultural landscape at Jingshan Entrance. For the sake of integrating the inheritance of Zen Tea culture and farming culture, and to exhibit the characteristics and temperament of the Zen Tea artistic conception of "the world's Jingshan Mountain and the first town of Zen Tea", the planning concept of agricultural landscape is positioned as: "experiencing the countryside; enjoying its pleasures; tasting the mood of Zen Tea" after teasing out the relationships among "heaven, earth, people, the city, countryside, tea and environment". With the perception and experience of Zen Tea culture as the main line, the four-stage spatial system that provides gradual immersive experience including "origin→ precipitation→ experience→ Zen meditation→ Zen state" is constructed. To be specific, it is enclosed mountain forest (closed) --- vast tea hills (open) --- deep and serene landscapes (semi-closed) ---- endless tea towns (open), as is shown in Figure 1.



Figure 1. Agricultural landscape at Jingshan Entrance of Hangzhou-Changsha expressway.

Agricultural landscape at Jingshan Entrance not only fully combines agricultural landscape and farming culture with the landscape of the entrance, but also is closely linked with the overall planning of Jingshan. For one thing, it exhibits the rural landscape and Zen Tea culture; for another, it enables agricultural landscape and unique local cultural artistic conception to wedge into the downtown areas in Hangzhou. Thus, this case is an ideal and excellent example that achieved urban and rural integration. Therefore, not only are production, ecology and culture values brought, but also the development of rural tourism as well as the integrated development of urban and rural areas in Jingshan is enhanced.

3.2. The Construction of Agricultural Landscape at Longwu Entrance of Hangzhou City Highway

Longwu Entrance is located in Longwu Town, Zhuantang Street, Xihu District, Hangzhou City. Longwu Town enjoys a reputation of “a Small Town Immersed in the West Lake Lung Ching Tea”, is characterized by stretches of tea hills with gentle slopes, and is known as the “Protection Area of the West Lake Lung Ching Tea”. It is the leading grower of the West Lake Lung Ching Tea with a plantation area covering more than 14,000 Chinese acres, and produces 70% of the total West Lake Lung Ching tea. Furthermore, known as a “Tea Town of Thousand-Year History and High Output”, it is not only listed into the most beautiful villages in Zhejiang Province, but also the only “characteristic town themed by Chinese tea” in China. With “tea culture, tea technology, tea life” as its core, Longwu Town strives to develop creative products, tourism and museums related to tea. Therefore, the town becomes one of six major scenic spots that are recently exploited by Hangzhou City as well as an ecological tourism scenic area of the gold traveling line along the “Three Rivers and Two Lakes” region. Notably, it creates an opportunity for urban residents to return to nature, appreciate local customs, relieve stress and enjoy rural culture.

Longwu Entrance is the main entrance into Longwu scenic spot surrounded by mountains on three sides with rich vegetation, beautiful natural environment and a vast area of tea plantation. Therefore, the Entrance is positioned as an expressway entrance integrating agricultural landscape with the natural landscape space of “green mountains, fragrant tea, soothing scenery and beautiful streets”, and it has also become a new landmark for “the most beautiful Longwu Tea Town in Zhejiang”. To be specific, the landscape at the Entrance consists of “one center, two landscape zones and two far-view areas”. With the toll station as the center, the themed sculpture composed of the randomly scattered tea leaves, is combined with the display of the tea town and hills and the application of artistic creations, thus leaving the first impression of “Thousand Year Tea Town” on passers-by in an abstract and artistic manner. Besides, it should be mentioned that the two landscape zones are Liuzhuan Road Tea Culture Landscape Street and Liusi Road Red Maple Landscape Zone, while the two far-view areas refer to the landscape area of tea hills and gardens and Daqinggu Natural Ecological Landscape Area, as displayed in Figure 2.



Figure 2. Agricultural landscape at Longwu Entrance of Hangzhou City Highway.

At Longwu Entrance, agricultural landscape is interspersed and fused with natural landscape, constituting a three-dimensional rural picture with the coexistence of ecology and humanism, thus playing a pivotal role in turning Longwu Town into a themed scenic spot of tea culture with unique charm, and having attracted an increasing number of urban residents to visit it. Due to the in-depth integration of urban and rural areas, Longwu Entrance produces multiple values, such as production value, ecological value, agricultural value and leisure value ordinary expressway entrances lack.

3.3. The Construction of Agricultural Landscape at the South Entrance in Hangzhou of Changchun-Shenzhen Expressway

The South Entrance of Hangzhou as the intersection of Zhipu Road, the City Highway of Hangzhou and Changchun-Shenzhen Expressway is an important hub to enter Hangzhou from the southwest. The Entrance is located in Mailingsha Community of Shuangpu Town in the southwest of Hangzhou, when Shuangpu Town is adjacent to Hangzhou Zhijiang National Tourism Resort in the north, the Lingshan Tourist Scenic Spot of Xishan National Forest Park in the west, and the Qiantang River in the east, with advantageous resources like mountains, waters, fields and gardens. In terms of the agricultural characteristic of Shuangpu Town, it is reflected in urban agriculture, namely the scientific and technological agricultural demonstration park, characteristic and advantageous agricultural production base, and urban agricultural base integrating production, leisure, sightseeing, entertainment and catering.

The agricultural landscape space planning of the South Entrance of Hangzhou is aimed at reaching an ideal state of

“the shape of mountains, joy of waters, delights of fields and poetic imagery of gardens”, in which “mountains, water, land, gardens, the city, and people” coexist in a harmonious way. Besides, it is hoped that pastoral and forest can come into sight of urban residents, and that cities then are endowed with features of pastoral and forest, thus highlighting the natural beauty of the rural environments and constructing an entrance landscape that is characterized by “nostalgia”, “the fusion of feelings with natural setting”, “return to simplicity” and “urban-rural integration”. In the end, the entrance of the city is supposed to be “prominent in agricultural quality, proper in the degree of space openness, and rich in welcoming atmosphere”. In terms of landscape space structure, the South Entrance of Hangzhou is a wedge-shaped green corridor space that connects the urban agricultural landscape and the urban forest landscape and echoes with them. It is worth mentioning that the green corridor is divided into four sections from the countryside to the city, which are Permaculture Park, forest ecological exhibition area, urban impression area, and the experience area of natural vitality. Taking the features of Shuangpu Town into consideration, part of the viaduct under the ramp of Hangzhou South Hub is included in Permaculture Park, the half of which is composed of water areas, while the other half consists of land areas, when functioning as the turtle breeding base and the recycling breeding base, respectively. Obviously, these vigorous animals bring rustic natural flavor and life to the expressway entrance. In addition to that, the forest ecological exhibition hall is the toll station which is a momentous landscape axis of Hangzhou City. Generally speaking, the landscape of green urban forest is built up, and on both sides of the expressway entrance, the landscape is created with forest as the background along with the open grassy areas, forming a natural habitat where urban forest and agricultural landscape are blended. Additionally, various plant elements of different shapes and heights are adopted in Forest City Impression Area and Experience Area of Natural Vitality, attempting to create vibrant and dynamic canopy lines and forest margin lines, thus ushering nature into the city and showing the city’s humanity history simultaneously.

The combination of agricultural landscape with urban landscape at the South Entrance of Hangzhou not only intensively and efficiently takes the advantage of land space at the entrance to accelerate agricultural production, but also integrates the idyllic agricultural landscape into the urban landscape. In this case, the entrance landscape space becomes more vivid, diverse and vibrant.

4. Conclusion

Based on the aforementioned cases, it can be seen that constructing agricultural landscape at expressway entrances breaks the traditional pattern that farmland and the city are in opposition to each other, avoids the constraints of land properties, and creates the harmonious relations between human beings and land. Therefore, such design not only enriches the ecological function of expressway entrances, but endows expressway entrances with many cultural, social, and

economic functions, so that local culture, traditional culture and farming culture with humanistic spirit can be better disseminated, and the proceeding maintenance cost of urban green space can be lowered to a large extent. Moreover, this design creates beautiful landscape that is full of vitality and distinctive features, contributes to urban biological diversity, and promotes the coordinated development of the city and nature. Apart from that, it deepens urban-rural integration and attracts more urban residents to appreciate agricultural landscape via expressway entrances, so that they could return to nature, experience and participate in refreshing and simple farming life and enjoy pastoral life. Thus, there can be a conclusion that the construction of agricultural landscape at expressway entrances as well as the planning and management of urban landscape in the light of agricultural landscape can generate new cultural landmarks, which is thus worthy of reference.

5. Discussion

5.1. Strategies for the Construction of Agricultural Landscape at Expressway Entrances

5.1.1. Being Incorporated into Urban and Rural Planning for Adopting the Overall Planning of Urban-rural Integration

At the stage of urban and rural planning, the agricultural landscape space layout at expressway entrances should be taken into account. To be specific, based on the principle of intensive, efficient and reasonable spatial utilization, the reasonable layout of agricultural landscape at expressway entrances is desirable. It is expected that agricultural land can be wedged into the urban areas, and overlap with the urban green space system, thus serving as the urban green corridor and the corridor for green food production. Besides, the spatial layout of urban and rural areas should be optimized so as to promote the integrated, scientific, coordinated and sustainable economic and social development between these two areas. Finally, the agricultural landscape at expressway entrances could set an excellent example for urban-rural integration.

5.1.2. Being Multi-industry and Multi-disciplinary and Integrating Various Elements

The agricultural landscape zone at expressway entrances should be combined with urban ecology to form a sustainable ecological development mode, while it not only belongs to the scopes of landscape architecture, urban planning, urban design, culture and arts, but is involved in the category of agronomy. In accordance with ecological principles, plants, animals and natural resources should be allocated rationally. In addition, in virtue of imitating the natural ecosystem, multidisciplinary integration, reasonable configuration, and the correlation between each element, the state of low energy consumption and high productivity can be reached and maintained within a certain period of time. For instance, plants are irrigated by collecting and recycling rainwater, and reasonable disease monitoring and control techniques are adopted to realize the intellectualized plant pest control as

well as the ecological diversification, at expressway entrances of Hangzhou City. They also can make use of the newest innovations, such as vertical farming, automation, artificial intelligence and digital platforms that enable farming from a smartphone (e.g., control irrigation, monitor soil moisture, greenhouse ventilation, automated compost turning) [23]. And they also can construct stormwater infrastructure, demonstration gardens, playgrounds, fruit and vegetable picking garden, picnic areas, nature classrooms, education center, Barbecue area, urban farm plots, fitness area, gardening area, market pavilion event center, additional parking, etc [21].

5.1.3. According to Local Conditions and Highlighting Farming Culture

For the reason that the shape, area and land properties of expressway entrances are varied, the planning and construction of agricultural landscape should be flexible and diverse in accordance with local conditions. In other words, agricultural landscape that is filled with local cultural characteristics and is easy to plant and maintain should be selected to give prominence to local culture, such as the Yangtze River Delta where “flowers are in bloom; mangroves are in disorderly crowd; grass grows and egrets fly over the quite West lake”, the orchards where “thousands of pear trees are amazingly in bloom”, the vegetable gardens where “yellow butterflies surround the fields”, and the paddy fields where “seedlings of autumn rice are orderly”.

5.1.4. Being Guided by the Government and Advocating Diversified Agricultural Businesses in Urban and Rural Areas

On account of the complicated land properties at expressway entrances, the government is supposed to guide and engage in corresponding agricultural landscape planning and enactment. For one thing, the issues related to lands should be well solved. For another, the governmental sectors are expected to attract a larger scale of participation from urban and rural residents, encourage social funds, strive to develop circular agriculture, multi-function agriculture, sustainable and intensive agriculture, regenerative agriculture, climate-smart agriculture and agritourism, such as park and recreation engagement operators can organize community members to grow and prepare healthy, locally sourced foods from the year-round farmers market, home farms or agriculture parks at the expressway entrance through the program of “Access to Healthy Food”. The new local agriculture-based businesses can create new spaces for urbanites to spend time outside at the city entrances [21].

5.2. Recommendations for Follow-up Work

The application of agriculture landscape at the expressway entrance, which has important instructive significance, should be incorporated into urban planning on the basis of feasibility study and economic benefit analysis. At the same time, agriculture landscape aesthetics, urban agriculture cultivation

technology, irrigation technology, operation management and other aspects at the expressway entrance are worth further research. Moreover, the recreational and educational functions and values of the agricultural landscape at the expressway entrance deserve more attention.

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