

Landscape Planning and Design of Modern Urban Eco-sightseeing Agricultural Garden

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Abstract. With the strengthening of ecological and environmental awareness, under the influence of sustainable development concept, the planning and design of new modern urban eco-sightseeing agricultural garden, which integrates agriculture, sightseeing and relaxation, has been started to promote the development of agriculture. Based on the planning and design of modern urban eco-sightseeing agricultural garden in our nation, this paper analyzes the background and developing stages of domestic sightseeing agricultural garden, as well as different categories, taking Xinghua Modern Sightseeing Agricultural Garden and Wufeng Agricultural Scientific and Technological Demonstration Garden as example, to analyze how to maximize the adjustment measures to local conditions; this paper also uses local agricultural resources to make planning and design of distinctive and individualized eco-sightseeing agricultural landscape garden so as satisfy urban people's desire and needs to get back to the nature.

Introduction

Sightseeing agricultural garden, an organizational form of sightseeing agriculture and a new type of garden, is a comprehensive park taking agricultural production as the main part and sightseeing, eco-tourism, and relaxation as main functions. To some extent, the landscape in sightseeing agricultural garden integrates production, ecology, recreation and knowledge to a whole, which is a representation of people getting back to the nature. Premier Wen Jiabao puts forward that “the 21st century is the key period for our nation to realize agricultural modernization in which the modern agriculture should be high-efficiency ecological agriculture”; therefore, the concept of eco-sightseeing agricultural garden appears, emphasizing multiple functions of tourism, agricultural efficiency, afforestation, beautification, environment improvement, and so on, which suits the theoretical guidance of the path of sustainable development.

In the big environment of rapid development and quickening urbanization, urban people are tired of the noisy environment in cities and thirsty for getting back to the nature, which provides conditions for the planning, construction and development of urban eco-sightseeing agricultural landscape gardens. Meanwhile, urban eco-sightseeing agricultural gardens are close to the urban area and have sufficient customers, supported by abundant policy, capital, technology, and talent, with scientific and reasonable planning and design, which greatly promotes the development of modern urban eco-sightseeing agricultural garden in our nation.

Development and categorization of sightseeing agricultural gardens in our nation

The origin of sightseeing agricultural garden is as early as the 1830s; it started to propel and develop globally in the middle of the 19th century; in China, sightseeing agriculture started in Taiwan and now it has become one of the important types of agricultural tourism, favored deeply by the mass. The development of sightseeing agricultural gardens have experienced 4 stages: emergence stage, development stage, standardized operation stage, and outlook stage; more details can be seen in Table 1:

Table 1 Stages of development of sightseeing agricultural gardens in China

Stages	Time	Contents and features
Emergence stage	1980-1990	Agricultural garden concept has not formed yet; mainly use agricultural resources in suburbs and scenic spots and combine local characteristics to develop sightseeing tourism with various forms, among which fruit festivals, peach flower festival are most representative agricultural sightseeing tourist landscape, promoting local economic development.
Development stage	1990-2000	In the economic transition period, against the background of agricultural industrial structure optimization and urbanization, good conditions are provided for sightseeing agricultural gardens, agricultural gardens or scenic spots as construction carrier, agricultural gardens as core and emphasis, to realize various “rural home inn” activities of picking, fishing, vegetable planting, and picnicking.
Standardized operation stage	2000-2011	Transition in the stage of comfortable level of living, when people have various demands for recreational tourism, value eco-tourism, green consumption, cultural connotation and technology and knowledge, and expand the functions of agricultural gardens to such aspects as recreation, vacation, experiencing, and learning, enriching agricultural tourism.
Outlook stage	2012 to future	With the elevation of living level, people have stronger desire for good ecological environment and return to the nature; low-carbon lifestyle and green tourism become important concepts for sightseeing agricultural gardens.

With the continuous development of sightseeing agricultural garden, its category shows variety, which are mainly sightseeing plantation, ruralized plantation, botanical gardens, forest park, folk-custom appreciation village, agricultural view garden, tourist farm, self-service farm, recreational farms, ecological agricultural village, tourist farm, technological plantation, sightseeing picking garden, educational plantation, high-tech agricultural demonstration park, rural inn, ecological agricultural garden, citizen plantation, recreational farm, folk-custom cultural village, and so on.

According to the differences of development mode, they can be divided into park operating type, scenic spot sightseeing type, commercial serving type and education practicing type; according to agricultural institution, they can be divided into: sightseeing planting industry, sightseeing forestry, sightseeing animal husbandry, sightseeing sideline production, sightseeing ecological agriculture; according to agricultural practice, they are divided into: recreational, experiential, educational, commercial, and festival; according to region, they are divided into sightseeing agriculture with place of origin of specialty, sightseeing garden of featured farming, garden spot in the suburbs, ornamental fishery in lakes, sightseeing pastures in mountainous area, and individual sightseeing farms, and so on.

Landscape planning and design of modern urban eco-sightseeing agricultural gardens in our nation and instance analysis

To meet people’s demands, at the time of developing landscape planning and design of urban eco-sightseeing agricultural gardens, it needs to take the local specific conditions into consideration, follow certain principles and goals of planning, adjust measures to local circumstances to the maximum, make full use of local terrain, environment, agricultural resources, and so on, increase

the practical application of technology, to create unique sightseeing agricultural gardens with sharp characteristics, reaching “the goal of I have what others don’t have, my products newer, finer and special products than the others” and promoting sustainable development of sightseeing agricultural gardens in our country. The most important part is to satisfy certain landscape indicators at the time of planning and design, which concludes patch proportion (PLAND), patch density (PD), circumference surface integral dimension (PAFRAC), patch degree of polymerization (AI), and so on, the computational formula is as following:

$$PLAND = P_i = \frac{\sum_{j=1}^n a_{ij}}{A} (100) \quad (1)$$

In the formula above, a_{ij} refers to the area of patch ij ; A stands for the total area of all the landscape; PLAND measures the component of landscape and calculates the relative proportion of certain patch type to the whole landscape area; when the result tends to be 0, it indicates that this kind of patches is very rare in the landscape; when the value is 100, it shows that the whole landscape is composed of only one type of patch.

$$PN = \frac{n_i}{A} (10000)(100) \quad (2)$$

PN is the base index of landscape pattern, with the unit of patch number/ 100 hectares, showing the patch number on 100 hectares, favorable for the contrast among landscape of different sizes. n_i refers to the total area of i type landscape elements.

$$PAFRAC = \frac{\left[n_{ij} \sum_{j=1}^n (1np_{ij} - 1na_{ij}) \right]^2 - \left[\left(\sum_{j=1}^n p_{ij} \right) \left(\sum_{j=1}^n a_{ij} \right) \right]}{\left(n_i \sum_{j=1}^n 1np_{ij}^2 \right) - \left(\sum_{j=1}^n 1np_{ij} \right)^2} \quad (3)$$

a_{ij} stands for the area of patch ij , p_{ij} for the patch perimeter, n_i for patch number; the value is usually between 1-2; the more the value is closer to 1, the more regular patch shape is, with high degree of man-made interference; on the contrary, the more the value is closer to 2, the lower the degree of man-made interference is.

$$AI = \left[\frac{g_{ii}}{\max \rightarrow g_{ii}} \right] (100) \quad (4)$$

Here, g_{ii} stands for the similar adjacency patch number of corresponding landscape type; AI is mainly calculated based on the common boundary length of the same type of patches.

This paper takes Xinghua Modern Sightseeing Agricultural Garden and Wufeng Agricultural Scientific and Technological Demonstration Garden as example, analyzing their advantages in planning and design in specific, so as to provide theoretical and practical references for the construction and development of more eco-sightseeing gardens.

Practice of planning and design of Xinghua Modern Sightseeing Agricultural Garden

Xinghua Modern Sightseeing Agricultural Garden locates in Lincheng town, Xinghua city, Jiangsu Province, with the planning land to new provincial road S333 in the south; there is natural riverway as boundary between the west and the north; the garden is next to provincial road S231 in the east, with the total planning area of 50 hm^2 . In the garden, there are natural resources, beautiful scenery, and favorable ecological conditions, with farmland landscape as the main part; meanwhile, the riverway has abundant river system and dense river network, which equips the garden with great water area natural landscape. The climate in the garden is northern subtropical humid climate, with sufficient rainwater, adequate sunshine, sharp seasons, and pleasant climate; the heat doesn’t last long, the coldness is rather short, and the frost-free season is rather long; the wind blows to the east

for the whole year and the climate condition is rather advantageous; the soil is the sediment from Yangtze River, Yellow River, Huaihe River and other lakes and oceans. The superior natural conditions establish solid foundations for the creation of high-quality modern sightseeing agricultural gardens.

Xinghua Modern Sightseeing Agricultural Garden focused on the four concepts of greenness, efficiency, uniqueness and innovation. It sticks to ecological priority to realize green development; it sticks to resource intensiveness to realize efficient development; it sticks to characteristic positioning to realize dislocation development; it sticks to technology guidance to realize scientific development. The garden focuses on the construction of the whole city's modern sightseeing agriculture in Xinghua, taking the transformation of agricultural development mode and acceleration of agricultural transformation and upgrading as the mainline, the comprehensive development of agricultural functions as the leading role, the structural reform and mechanism innovation as impetus, the technological and informationalized service innovation as support, and government leading, enterprise dominant, and benefit driven as thinking train, to construct modern agricultural garden integrating technical research and development, high-efficiency agriculture, ecological agriculture and recreational agriculture.

Based on the concepts and principles in planning and design, this paper makes overall layout on Xinghua Modern Sightseeing Garden, the floor plan and the aerial view are shown in Figure 1 and 2:

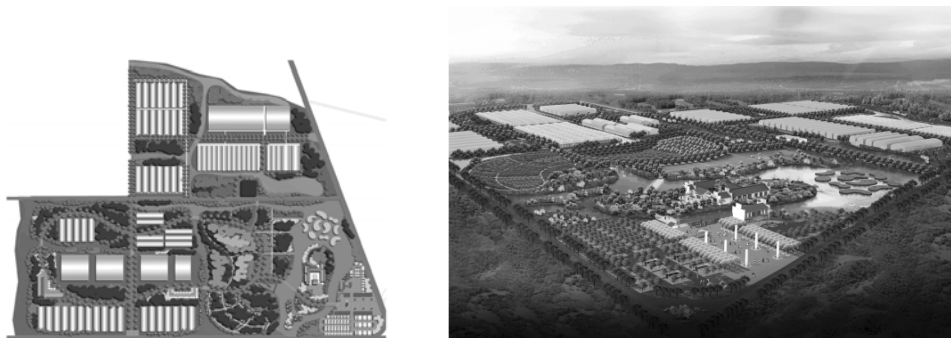


Figure 1: Floor plan of the overall planning of Xinghua Modern Sightseeing Agricultural Garden

Figure 2: Aerial view of the overall planning of Xinghua Modern Sightseeing Agricultural Garden

From the figure above, the structure division of Xinghua Modern Sightseeing Garden embodies the pattern of “one center, two circles, five plates, eight spots”, forming the ecological three-dimensional landscape structure of modern sightseeing agricultural garden with the combination of dots, lines and faces. The center refers to comprehensive serving center; two circles refer to annular main street and annular river system recreational sightseeing belt; five plates include comprehensive serving center plate, Israel high-efficiency agriculture plate, “farmer orchard” demonstration picking plate, facility horticulture plate, Lixiahe landscape innovation experiencing and recreational plate; eight spots refer to 8 independent but interrelated spots.

The facility horticulture plate is in the southwest of the garden, including intelligent temperature control connective plastic greenhouse, sunlight greenhouse area, and sunlight greenhouse vegetable planting area. Intelligent temperature control connective plastic greenhouse has an area of 25000m², annually producing 50 million vegetable sprouts of leafy greens, solanaceous vegetables, melons, and beans, and so on; sunlight greenhouse area is used for the production of solanaceous vegetables and melons, and other warm season vegetables, to ensure the balanced supply of vegetables. The most characteristic is Lixiahe landscape innovation experiencing and recreational plate, in the southeast of the garden, including Lixiahe landscape innovation experiencing area, recreational fishing area and “QQ” farm area, which makes full use of the original conditions of the place, integrating and improving natural ecological environment, human landscape, folk custom and agricultural production activities through the design of environmental landscape, so as to provide people with a sightseeing industrial garden suitable for sightseeing, recreation, entertainment and participation.

Practice of planning and design of Wufeng Agricultural Science and Technology Demonstration Park in Suzhou

Wufeng Agricultural Science and Technology Demonstration Park in Suzhou is located in Wufeng Village, Mudu Town, Suzhou City; in the north, there are Longchi scenic spot and Tianping Mountain scenic spot, and in the east, there is Lingyan Mountain scenic spot; it is near the mountain and by the river, with pleasant scenery, outstanding people and great land; the total area is about 13.7hm², with Qiongling road in the south; it is surrounded by numerous mountains with convenient transportation and sufficient resources, and the advantages in resource and strong developing potential are obvious. The advantages mainly are: ①location advantage. Wufeng Agricultural Science and Technology Demonstration Park in Suzhou is located in Wufeng Village, Mudu Town, Suzhou City, which is surrounded by scenic spots, with beautiful environment and good ecological advantages, and it forms functional complementation with other scenic spots to elevate the comprehensive competitiveness of the regional tourism; ②convenient transportation; ③fronting water and with hills on the back with pleasant climate, favorable for planting great flowers and vegetables, and so on; ④good facility conditions in the base and beautiful hill background outline.

The general idea of the planning of Wufeng Agricultural Science and Technology Demonstration Park is to create a planning scheme gathering technical research and development, demonstration and promotion, agricultural production, landscape construction and sightseeing popular science education, able to realize high unity of economic benefit, social benefit and ecological benefit. The planning idea shows the principles of adjusting measures to local conditions, embodying characteristics, ecological agriculture, respecting the nature and people first; under the guidance of planning concepts and guidelines, it combines the features of spot to make landscape planning, the specifics of which can be seen in Figure 1:

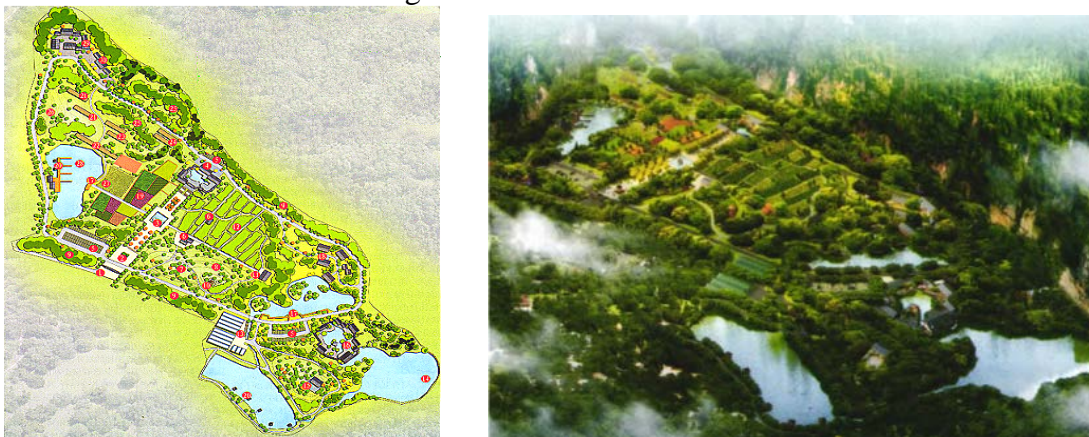


Figure 1 Sketch map of overall planning of Wufeng Agricultural Science and Technology Demonstration Park in Suzhou

Figure 2 Planning effect of Wufeng Agricultural Science and Technology Demonstration Park

From the planning figure, it can be seen that the park is divided into entrance landscape area, ecological breeding demonstration area, agricultural crop technological demonstration planting area, new species of vegetables and fruits display area, agricultural research and development center, intelligent greenhouse cultivation demonstration area, ornamental plant landscape area, and Island of Angels artistic main landscape area, and so on. In the park, the wood structure in the design satisfies the basic usage function, which can effectively avoid land use conflict; meanwhile, wood structure expresses coordination and unity in the forest, making the tourist and ornamental effect more significant, which can be seen in Figure 2:

Wufeng Agricultural Science and Technology Demonstration Park in Suzhou makes full use local resources in the overall planning and design, which reflects regional features and provides conditions for tourists to feel agricultural scenery, to understand agricultural culture, to learn agricultural knowledge, and to participate in agricultural production activities. It accelerates the integration of urban and rural cultures and promotes the development of agricultural culture, to

form civilized rural fashion. Meanwhile, the Agricultural Science and Technology Demonstration Park leads ecological agriculture and sustainable development, creating green atmosphere, showing environmental protection, and highlighting ecological features, which exerts important influence in the process of propelling the development of modern agriculture and effective agriculture.

Conclusions

To sum up, from the practice of Xinghua Modern Sightseeing Agricultural Garden and Wufeng Agricultural Scientific and Technological Demonstration Garden, we can easily see that as long as we use the local resources and environment to the maximum, adjust measures to local conditions, stick to people first, and emphasize greenness, environmental protection and technology, we can create characteristic ecological sightseeing agricultural garden, providing experience for social harmonious, healthy and sustainable development.

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