Reflections on the Improvement of Rural Human Settlement Environment from the Perspective of Beauty and Livability

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Abstract The construction of beautiful and livable villages is one of the important tasks of rural revitalization in the new era, and the development of rural areas attaches more and more importance to the improvement of human settlement environment. By investigating the construction status and existing problems of Zhaoba Village in Nanjing, it tries to take "beauty" and "livability" as the planning requirements. The village positioning is planned accurately, and the functional layout is carried out reasonably. According to the characteristic industries, landscape features and infrastructure of Zhaoba Village, humanized construction strategies are put forward, thus improving the quality of human settlement environment in Zhaoba Village.

Keywords Beauty and livability, Rural revitalization, Human settlement environment, Zhaoba Village

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Since the reform and opening up, the rapid urbanization process has improved the economy and supporting facilities of cities. The convenient and comfortable urban living environment has attracted a large number of rural populations to enter the cities. The hollowing out and aging of rural areas have also widened the gap between urban and rural areas. Therefore, China is increasingly valuing the construction and development of rural areas. The strategy of "rural revitalization" proposed in the report of the 19th National Congress of the Communist Party of China has become the main direction for rural development. With the development of urban-rural integration, China's goals and needs in rural construction have become more clear. However, some rural areas still have weak links such as backward living environment, insufficient infrastructure, and imbalanced regional development.

In 2018, the General Office of the Jiangsu Provincial Committee of the Communist Party of China issued the *Three-year Action Implementation Plan for Improvement of Rural Living Environment in Jiangsu Province*. The plan aims to prioritize a group of rural living environment improvement pilot projects. After creating a group of demonstration villages with positive guiding effects, the overall construction level of Jiangsu Province is improved through a combination of points and surfaces. By 2020, the ultimate goal of building beautiful and livable rural areas in Jiangsu Province is to significantly improve the rural living environment, make villages beautiful and livable, and farmers satisfied and happy[1].

Therefore, the construction of beautiful and livable countryside urgently needs to form new rural planning concepts and methods, and clarify the relationship between beautiful countryside and rural living environment[2]. Zhaoba Village is one of the demonstration villages in Jiangsu Province that has launched activities to improve the rural living environment. In this paper, the protection and utilization of rural elements are explored in the process of building beautiful countryside. From the perspectives of characteristic industries, landscape style, and infrastructure, constructive strategies are proposed for the living environment of Zhaoba Village, in order to provide some reference for the construction and planning of similar beautiful and livable villages.

1 Interpretation of beautiful and livable countryside

The so-called beauty indicates beautiful village planning, ecological environment, living atmosphere, and spiritual outlook. "Livability" refers to the completeness of supporting facilities and systems. Specifically, it can be reflected in six aspects: public service facilities, infrastructure, environmental sanitation improvement, village appearance improvement, characteristic shaping, and rural management innovation (Table 1).

"Beauty" can be understood as achieving perfection or ideal state in appearance, proportion, layout, style, color, or sound, making people feel happy. There are fundamental differences between urban and rural landscapes. Urban landscapes are composed of modern buildings with diverse forms, colorful garden designs, and crisscrossing road traffic, while rural landscapes are more naturally formed settlements. After a long period of cultural and aesthetic changes, both rural residents and urban tourists have a richer and more urgent definition and demand for "beauty". In the process of constructing beautiful and livable rural areas, it is necessary to adhere to the principles of livability, suitability for business, suitability for tourism, and suitability for culture, and take "beautiful layout, environment, life, and spirit" as the construction goals, thereby fundamentally improving the rural living environment, highlighting rural characteristics, and creating "four beauties" of new rural areas. It should use the environment to retain residents, attract tourists, and promote rural construction and development[3].

"Livability" is the organic unity of human nature and the pursuit of a better life. The well-developed public service facilities and infrastructure in cities can provide comfortable and convenient living for residents, which has attracted a large amount of rural labor resources to flow to cities, resulting in hollowing out and aging of rural areas, and making rural development more backward. Therefore, the construction of beautiful and livable rural areas should adhere to the concept of "people-oriented", and build a beautiful living environment from

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the perspective of ensuring the normal life of farmers and attracting foreign tourists. This includes the construction and maintenance of rural living infrastructure such as sewage, garbage, toilets, roads, and street lights, as well as support for leisure and entertainment facilities, sports facilities, and medical facilities, so that rural residents are willing to live in rural areas, and tourists yearn for rural tourism.

It can help us understand the construction of beautiful and livable rural areas by clarifying the relationship between "beauty" and "livability". "Beauty" is a necessary condition for achieving beauty and livability, but it is not a sufficient condition. "Livability" should be based on "beauty". While exploring and improving the appearance of the village to ensure the rural environment and the physical and mental health of residents, it is also necessary to provide convenient infrastructure to ensure the normal life of rural residents. Therefore, beautiful and livable countryside is the organic unity of "beautiful" countryside and "livable" countryside, both of which are indispensable[4].

2 Overview of the human settlement environment improvement project in Zhaoba Village

2.1 Characteristics of the living environment in Zhaoba Village

Zhaoba Village is located at the southeast end of Longpao Street, Changshan Community, Liuhe District, Nanjing City, Jiangsu Province. It is adjacent to the Yangtze River and the Chu River to the south and north, respectively. The natural accumulation between the Yangtze River and the Chu River forms thousands of mu of riverbank wetlands, with a beautiful coastline of 9.6 km. The construction land of Zhaoba Village is about 28.4 hm^2, with 55 production groups in the village, merged into 20 village groups. There are 1,548 households and a total population of 5,357 people (Fig.1−2).

2.2 Current situation of the village

2.2.1 Unreasonable land use planning and lagging returns of rural industries. In the early stage of rural construction, Zhaoba Village did not make targeted and reasonable planning for construction land. Faced with policy pressure, it planned and constructed simultaneously, resulting in severe internal consumption of rural resources and heavy burden on farmers. The current industry in villages relies on traditional planting, lacking systematic planning and core leading industries with rural characteristics. The meager income in agriculture has led to a significant trend of labor outflow among young and middle-aged people. Left-behind elderly people lack awareness of modern industrial production and marketing, and agricultural production lacks systematicity and scale, and loses market competitiveness. A series of problems have led to low agricultural production returns and formed a vicious cycle.

2.2.2 Poorer rural ecological environment, and the life quality of residents needing to be improved. There are few garbage collection stations within the village. Due to the inability to handle daily accumulated garbage in a timely manner, it not only pollutes the land and rivers, but also affects the living environment of the village. At present, there is still a certain amount of dilapidated greenhouses in the village, with different styles and uneven quality of self built and later renovated houses (Fig.3). The internal landscape distribution of the village is disorderly, and the creation of rural style lacks local characteristics. Through a questionnaire survey, it was found that some villagers are not satisfied with the creation of public spaces within the village. They hope to add green landscapes and hard paving with a sense of design to provide a public activity venue that satisfies social entertainment and is pleasant.

2.2.3 Insufficient infrastructure construction affecting the production and living standards of residents. The internal roads of the village are mostly muddy paths or cuted roads, with only the main roads hardened with cement, and there is a lack of facilities such as signs, street lights, and motor vehicle parking lots. Motor vehicles can park freely in the empty space of the village. The large-scale land development in the area by rivers is insufficient, and the rainwater engineering in the village lacks coordination, and the sewage facilities have not achieved full coverage in the village. When encountering extreme weather, rainwater, sewage, etc. flow into fields or rivers through the road surface at will. Most villagers still use primitive dry toilets. In the current situation where inorganic fertilizers are commonly used in agricultural cultivation, the sewage treatment problem of primitive dry toilets has become the "main force" threatening the rural living environment[5].

3 Improvement plan for human settlement environment in Zhaoba Village, Nanjing City from the perspective of beauty and livability

3.1 Scientific functional layout helping to increase the income of villagers

Rural spatial planning is the primary link in creating a rural living environment, and is closely related to ecological landscape and facility layout. Different rural spatial layouts will affect the development of rural industries, ecology, and other aspects to some extent, while multifunctional industrial layout is the support for beautiful and livable rural areas.

After analyzing the current situation of location, land use, and living environment in Zhaoba Village, based on its function and structure layout, the basic planning idea of developing a beautiful and livable tourism village

Table 1 Evaluation project of standards for beautiful and livable village

No.	Evaluation project	Evaluation content
1	Public service facilities	Number of public activity and fitness venues
2	Infrastructure	Traffic network accessibility
		Sewage treatment coverage rate
		Number of garbage collection and transportation points
		Number of public toilets
		Coverage rate of power supply and communication supporting facilities
3	Environmental and hygiene improvement	Beauty of village entrance
		Environmental cleanliness
4	Village appearance improvement	Cleanliness of rural houses and courtyards
		Greening rate of village
		Standardization degree for the stacking of greenhouses and building debris
		Coverage rate of pole line setting
5	Characteristic shaping	Rural scenery
		Village identification
		Village style
6	Innovation in rural management	Rural culture and civilization degree
		Long-term management efficiency

is determined, which is divided into riverside leisure tourism development zone, vineyard picking experience area, fish pond leisure fishing area, modern agricultural sightseeing area, residential area of rich and beautiful countryside, high-standard farmland planting area, and health and leisure vacation area (Fig.4). The planning layout of "six areas and one belt" is spatially coordinated and organically linked in terms of functions. The plan adds activity squares, landscape greening, and related facilities, laying the foundation for shaping a good living environment and ecological landscape, thus forming a unique village appearance with Zhaoba characteristics.

The vineyard picking experience area is close to the main road. Before planning, it has had a certain planting foundation. After planning, the integration of the land resources can be used as one of the characteristic tourism industry projects. It could allow tourists to experience the fun of fruit picking and parent-child games. At the same time, it can extend the industrial chain, process and sell grape products. A modern agricultural sightseeing area is planned along the river of the village boundary, which includes tourist service areas, leisure and entertainment areas, and agricultural experience areas to meet the different needs of tourists. The health and leisure vocation area is a key tourism development project in Zhaoba Village, which includes lotus ponds, leisure squares, etc. It creates a pleasant vacation experience area with abundant water resources. The riverside leisure tourism development belt and fish pond leisure fishing area are characteristic development projects of Zhaoba Village. While developing, they respect the current landscape elements and local texture. The riverside leisure tourism development belt designs waterfront boardwalks and landscape bridges, serving as nodes connecting the village and scenic areas, and providing tourists and residents with immersive riverside scenery. At the same time, large-scale aquaculture of aquatic products could be developed in the fish pond leisure fishing area, to create a rural brand of Zhaoba aquatic products. In terms of the advantages of agricultural planting in Zhaoba Village, it should reasonably plan and layout high-standard farmland planting area, and build and upgrade the modern production system. Relying on e-commerce platforms, it could build an "Internet + agriculture" model of new era. By means of high-quality packaging and online pre-sale, it could improve the economic value of local agricultural products, solve the problem of unsalable agricultural products, promote the characteristic agricultural brand of Zhaoba Village, and effectively increase farmers' income[6].

3.2 Taking ecology as the foundation to comprehensively improve the ap–pearance of the village

Rural landscape is different from urban landscape. When carrying out rural ecological environment improvement, it is necessary to clarify the differences in the characteristics of different rural living environments. Tailored improvements can provide villagers with a comfortable environment with a sense of belonging and happiness[7]. The plan starts from three directions: regional landscape design, architectural style renovation, and public space creation, to play a leading and guiding role in promoting the construction of beautiful and livable rural areas.

3.2.1 Regional landscape design. The rivers and farmland around Zhaoba Village can serve as its landscape "background". Vegetation with local characteristics is used to strengthen the design of riverbank greening, and guardrails are built to create riverbank paths (Fig.5), making the riverside interface open and integrating ecology and countryside into the rural environment. Emphasis is placed on shaping a distinct image of the village entrance space, and the village entrance is set at the entrance of the main road. Combined with eye-catching archway and multi-level landscape, a clear spatial guiding role is played (Fig.6).

3.2.2 Coordination and unity of architectural style. It should scientifically renovate and transform some dilapidated buildings, such as painting the exterior walls, demolishing dangerous buildings, and using local materials such as red bricks and gray tiles for renovation, to maintain the overall harmony of the countryside style and appearance.

3.2.3 Creation of participatory public space. The public idle land in the village is divided into three categories, and a certain scale of rural public activity space is added. It considers building a basketball court on idle land with a large area, and a layered landscape is used to design and beautify small areas. The cement hardened fitness ground is renovated with anti-skid paving to enhance safety during fitness. A new pavilion adjacent to the fitness venue is built, and building materials have regional characteristics. The pavilion could be served as a resting place for people after exercising, and also as a place for entertainment, leisure, and gathering during leisure time[8] (Fig.7).

3.3 Innovating infrastructure to create a livable and travelable new Zhaoba

Most of the roads in the village have completed road hardening, and there are some broken roads in some areas. The planning plan will sort out the original roads in the village, a three-level pattern of village main roads, village branch roads, house and field paths is formed. Some broken roads will be opened up to ensure that the small roads in front of each household are connected to the main roads in the village. At the same time, the connectivity between internal and external roads in the village will be strengthened, and parking lots, street lights, traffic signs, markings, and other content will be added[9] (Fig.8).

Two new garbage treatment stations and one public toilet are built in the village. Garbage collection points are set up along the internal roads of the village with a service radius of 70 m. At the same time, garbage classification and treatment stations are added in areas where villagers live densely, allowing for on-site disposal of household waste. There is already a sewage treatment facility in the village, and the renovation plan will allow 15% of residents who are not connected to the facility to connect to the pipeline network, achieving full coverage of sewage treatment (Fig.9). The drainage system of the village should be improved (Fig.10). The pipe network is used to discharge rainwater, allowing it to flow into the drainage well along the way, and then flow into the farmland through the rainwater pipe network according to the terrain. At the same time, in response to the call for the "toilet revolution", a public toilet is added in the village. In combination with policies, villagers are encouraged to renovate their own toilets and provided with technical guidance on toilet renovation, so that toilet wastewater can be treated or reused as resources, thereby achieving the basic requirements of clean and tidy rural living environment.

4 Conclusions

The improvement of rural human settlement environment is a key link in rural revitalization. It should scientific position rural spatial planning, leverage local industrial

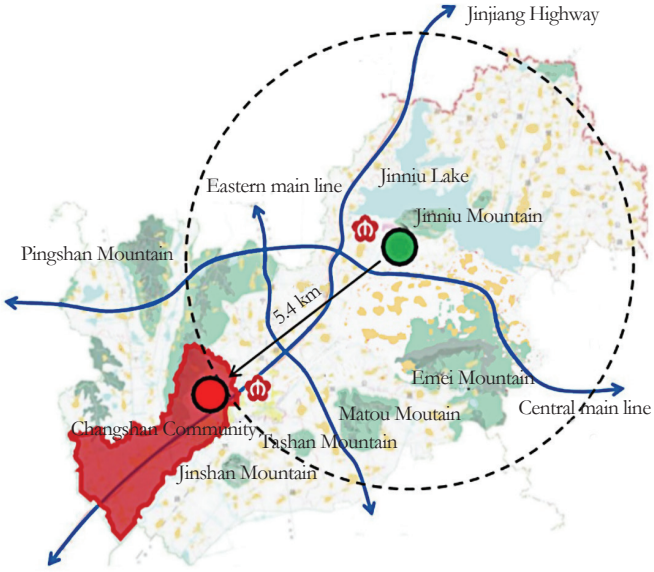

Fig.1 Location of Zhaoba Village

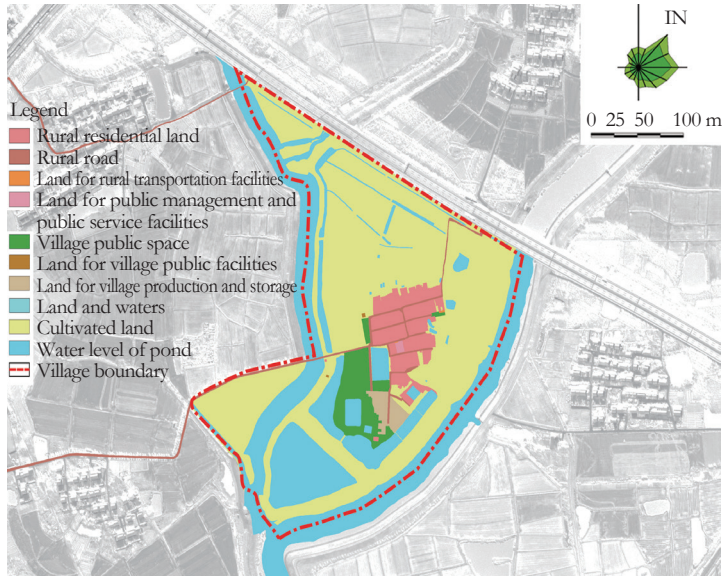

Fig.2 Planning scope of Zhaoba Village

Fig.3 Current buildings of Zhaoba Village

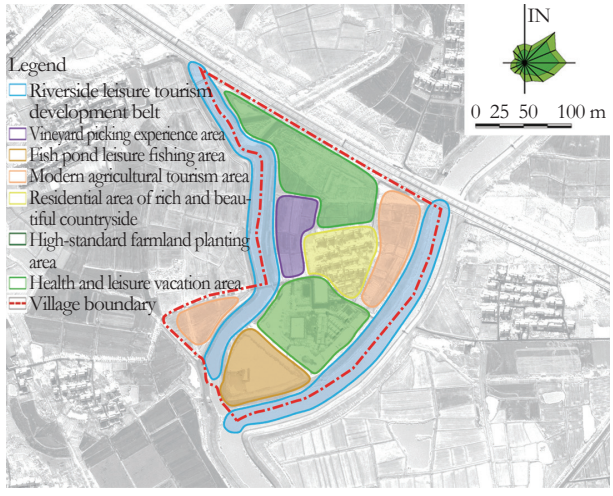

Fig.4 Overall functional layout planning of Zhaoba Village

Fig.5 Embankment of Zhaoba Village

Fig.6 Village entrance of Zhaoba Village

advantages to build a modern industrial chain, and improve the rural environment and quality of life on the basis of existing landscapes and greenery. In the context of rural revitalization, it should implement the construction of beautiful and livable rural areas. By improving the rural human settlement environment, positive explorations and attempts are made to promote urban-rural integration.

Fig.7 Pavilion of Zhaoba Village

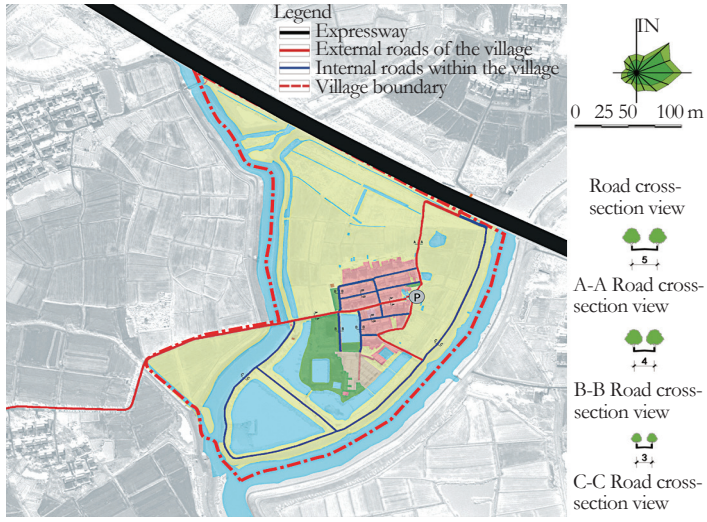

Fig.8 Road planning of Zhaoba Village

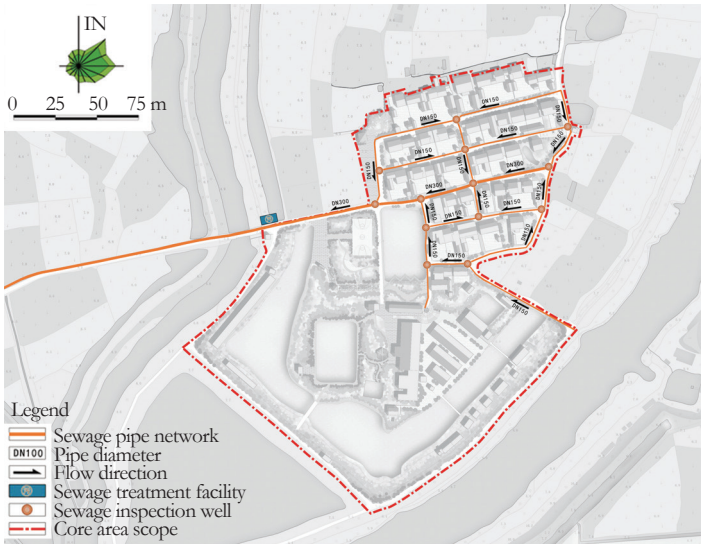

Fig.9 Sewage engineering planning of Zhaoba Village

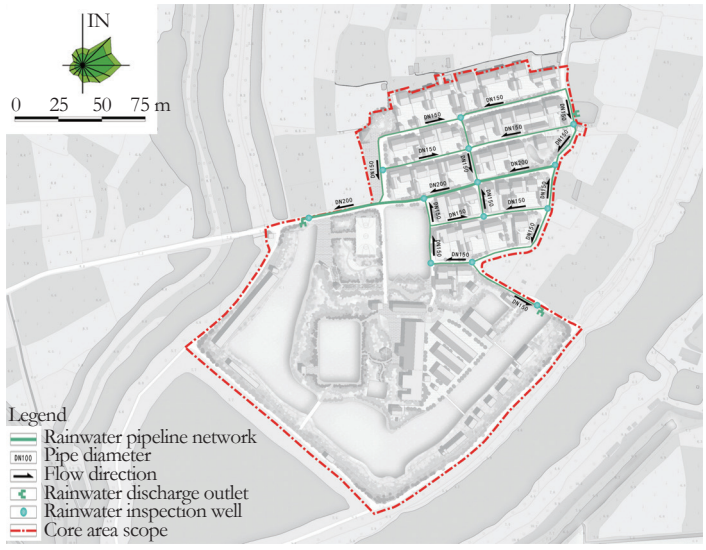

Fig.10 Rainwater engineering planning of Zhaoba Village

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