

A Planning Named Beautiful Rural Construction Based on Integrating of Production, Life and Ecology: *A Case Study of Baizhai Village in Suining City*

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Abstract. In response to the fifth Plenary Session of the 18th CPC Central Committee, the government of Sichuan province purposes the idea of constructing "happy and beautiful new village" all around Sichuan. Confronted with the problems such as fragmented industrial structure, backward supporting environment and ecological environment in the construction of new villages, the government of Sichuan province puts forward the planning and research of "Happy New Village" based on the idea of "Integrating production, life and ecology", hoping that the research would play a leading role in the construction of new countryside. Based on the concept of Integrating of Production, Life and Ecology and combined with layout of the settlements industrial agglomeration with functional upgrading, facilities completing, ecological conservation, this project would not only perfect the spatial structure, industrial development but also the programming of infrastructure and public service facilities. In doing so, the development pattern of overall regional spatial layout of "one area two corridors three strips six groups" was formed. At the same time, the harmonious development among production, living and ecology in Baizhai village was realized.

1. Introduction

It was mentioned in "CPC Central Committee's thirteenth five-year plan for formulating national economic and social development": The 13th Five-year plan is the decisive stage of building a moderately prosperous society in all respects. (Guiqing X,2015). The project called "beautiful rural construction" is a significant measure of promoting all-round Well-off society and a further reform of construction of million housing project. At present, under the cooperative mechanism of "government - enterprises -- villagers", the village has formed the economic security system of "government-induced investment -- enterprise investment -- villagers' financing".

Baizhai village is one of the central villages of Longsheng Town, Daying County. In the new rural construction, there are many problems, such as the mess of spatial layout, the fragmented distribution of agricultural industry, the backward allocation of facilities, and the deterioration of the ecological environment, which are the major obstacles to building a Well-off Society.

At present, in the political and economic aspects, Baizhai village has sufficient conditions to build a beautiful country with "ecological lead production and life". This paper is trying to achieve common development of economy, social and culture of Baizhai Village by planning its production, living and ecological environment, so as to provide theoretical and methodological references for the research that planning and construction of rural areas in China.



2. Present Situation of Baizhai Village

Baizhai village is located in the west of Longsheng town, adjacent to Daozu village in the east and Penglai town in the west, Xuanyin village in the north and Qingping village in the south, with a total area of 2.91 km². Chengnan highway goes through its southeast part and makes Baizhai village be a convenient traffic location(Fig.1). The land-use pattern is dominated by the east-west direction, forming a land use pattern with short depth and long transverse distance. The layer structure of the topography is obvious, its bottom is farmland area which shaped as a "Y", the second level is residential zone and dry land, the third level is woodland and mountain area (table1).

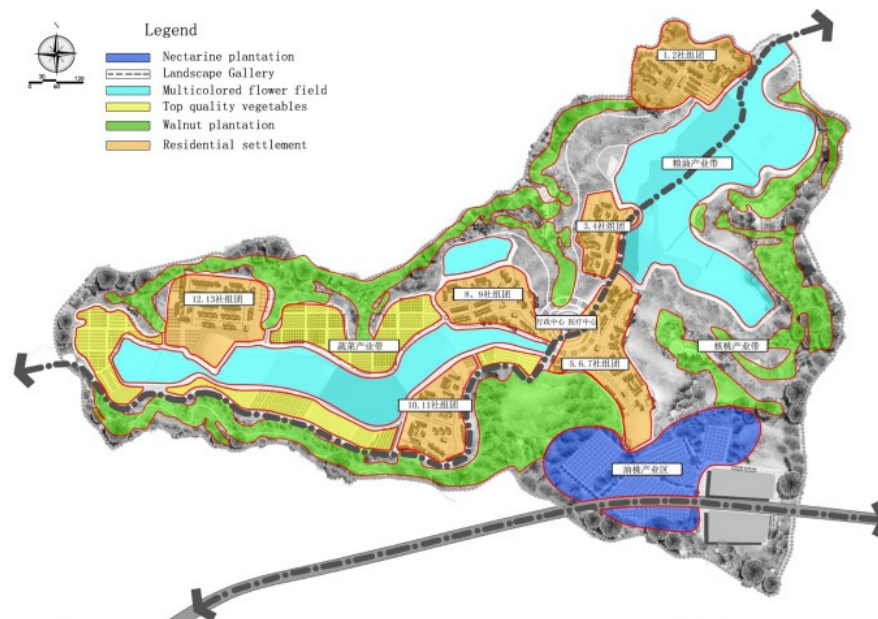


Figure 1 The location map of Baizhai village.

Table 1. The present situation of the land use of Baizhai village.

Types	Arable land	Garden	Woodland	Grass	Towns and industrial and mining land	traffic Land	Water conservancy facilities	Other land	Total administrative area
Area (ha)	147.2	0.37	54.19	8.32	33.54	9.91	6.24	31.79	290.86
Percentage (%)	50.61	0.31	18.63	2.86	11.53	3.16	2.14	10.93	100.00

The present situation of planning:

- Present situation of architectural layout: Fragmentation of building texture, buildings are scattered along both the sides of the road.
- Present situation of village industry: grain and oils, cotton, fruits are the main economic crops(Fig.2), aquaculture industry is dominated by poultry and aquaculture; the main features of the industry are small scale and poor management.
- Present situation of the infrastructure: the situation of the weak infrastructure construction becomes a major obstacle to develop. At present, there are 4.5 meters wide, 5100 meters long township road in the village, and 2.5 meters wide, 7200 meters long village road. Because the structure of road network is not obvious, and has the lack of car passing space, part of the road shall be widened and harden gradually to make the traffic unobstructed in the village. There are 8 ponds and one irrigation station in the village, the water in the pond and the river is used to

produce, and the water in the well is used in the daily life. A waste transfer station is located at 500 meters far from Longsheng Town, the village garbage transported to the transfer station regularly and processed, part of non-pollution garbage is treated by incineration and landfill. Power facility is the power station of 35 KV in the town, which yet to be upgraded. The telecommunication covers the whole village and the communication is incorporated into the city network. Natural gas can be used in the whole village, and the gas source comes from the gas distribution station in Daying County, transferring by the medium pressure pipeline with a diameter of 159 millimeters.

- Present situation of public facility: there is just a village committee office, an infirmary and a stadium serve as public facilities(Fig.3).

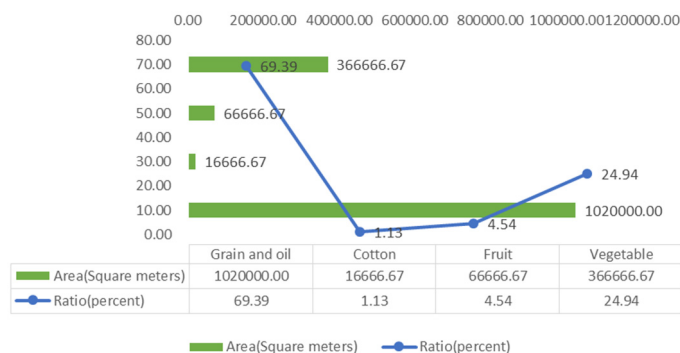


Figure 2 The original industry quantization figure.

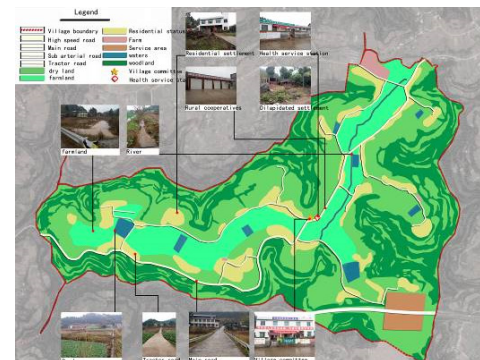


Figure 3 Land utilized of Baizhai village.

3. Planning idea and thinking

3.1. Connotation of "integrating of production, life and ecology"

Efficient agriculture production, comfortable living condition and beautiful ecological environment are regarded as the development goal of villages and small towns. Therefore, production, life and ecology are treated as three important indicators in this article for the planning of Baizhai village.

The ideology of ecological priority is widely used in the field of urban planning (Guo'En W, Xiaofeng Y, 2010, Tao T, 2013). But under the new situation of urban and rural co-ordination development, the idea of "ecological priority" runs through the village planning. It always provides high-quality ecological service guidance for village and town planning, realizes the rational construction and expansion of village space at the same time.

Eco-agriculture is vigorously developed in production. Eco-agriculture will become an important measure of industrial development, it can not only develop agriculture industry, but also develop some kinds of business activities such as production, marketing, cultural heritage and service and others. Eco-agriculture can realize the harmonious development of production and life.

Create an ecological living space. Living space includes people's living, consumption and entertainment places, etc. The ecological planning for living space is to build a healthy, clean, harmonious and livable environment with ecological means.

The production, life and ecology affect each other. Good living environment is the ultimate goal and is influenced by productivity, ecological concept provides security for efficient production and a better life (Yuan-yuan Z, Bin Y D, Ju-xin Z, et al, 2015). Based on the concept of "integrating of production, life and ecology", rural planning can be realized that the common development of production, life and ecology (Fig.4).

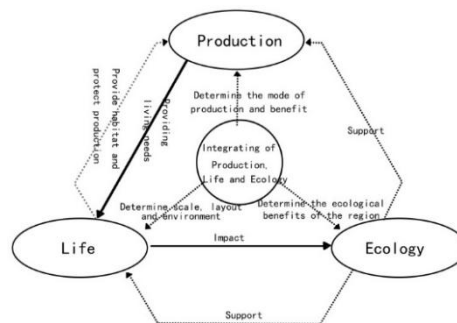


Figure 4 The association map of production-life-ecology of rural landscape.

3.2. Planning thinking under the concept of "integrating of production, life and ecology"

The master planning position the Baizhai village to a green agricultural industry base and rural tourism scenic resort. Based on the concept of "integrating of production life and ecology", three article ideas have been proposed. (1) Production conservation: taking the healthy ecological security pattern as the premise and taking the strengthen villages and enriching the people as the purpose, we optimize the industrial structure through the way of industrial agglomeration, create the green and eco-agricultural landscape pattern. Village's industry model is "Multi production linkage, put the focus on the stronger". The model can make village avoiding over-reliance on a single industry while implementing "One Brand for One Village Green and ecological agricultural industry driving the development of tourism while providing farmers with necessities of life, prompting coordinated development of "Agriculture - tourism - economy - ecological". (2) Life conservation: on the premise of livable and comfortable to make a scientific planning of settlement and establish a model village which is resource-saving and environment friendly. Infrastructure and public service facilities will be constructed under the premise of convenience and security. The road network will be improved; water, electricity and network supply system will be upgraded; the service facilities in education, health care, social welfare will be perfected. In this way, it can improve people's quality of life and attract more tourists. (3) The planning relies on the local resources to build an all-round ecological system. It encourages the development of clean energy, the use of livestock manure, build green energy-saving building, to build a good ecological environment of village, improve ecological efficiency, strengthen the ecological vitality and maintain ecological stability. (Huang Guang-yu, Yang P F ,2002)

Holding tight the concept of integrating of production, life, ecology to build Baizhai village into a model village of Sichuan province with strategies of developing diversified industrial structure, creating livable living space, and developing ecological environment for tourists.

4. Production, Life and Ecology integrated planning of Baizhai village

"Identifying the main functional areas and adding urban, agricultural and ecological space" was mentioned in "The guidance of 13th Five-year plan for reform and innovation of city and county economic and social development planning". (Wen C, Dongsheng Y and Wei S, 2015). The planning theme of baizhai village is to construct "happy and beautiful new village". In general, the integration of the three is from the integration of production and ecology, the integration of life and ecology. Specifically, the plan constructs the "happy and beautiful baizhai village" from four aspects: industrial development, rural settlement arrangement, infrastructure and public service facilities. (Fig.5)



Figure 5 General layout of Baizhai village.

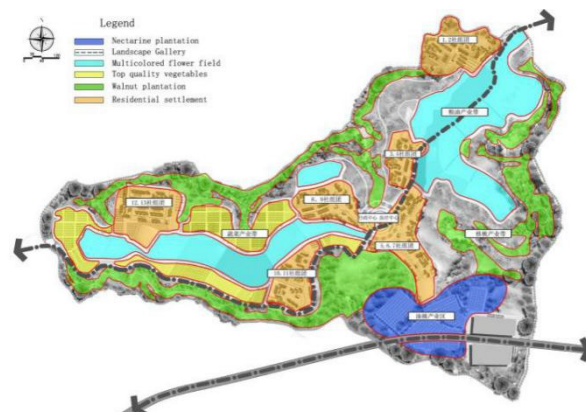


Figure 6 Spatial structure layout.

4.1. Space layout planning

A spatial pattern of "One area two corridors three strips six groups" was formed by grasping the extent of the development and the suitability of the development projects of each block from the whole, considering the suitability of the implementation of the project and the space environment, land use intensity, etc., strengthening the interrelation of each functional space (Fig.6). "One area" is the nectarine area which is one of the fruit-crop economies of the village. "Two corridors" refer to creating landscape corridors around the industrial belt and forming an ecological corridor with the main function of industry sightseeing. "Three strips" is three industrial belts based on the features of the village terrain: the bottom is the grain and oil industry, the middle-low is the high-quality vegetable industry, and the top is the efficient economic forest industry. "Six groups" are six residential zones which are planned based on the service radius and residents' opinions.

The planning of Baizhai village is based on the overall layout, taking the development mode of project guidance and environmental protection simultaneously, forming an ecological experience village form, achieving the unification of production and ecology, life and ecology.

4.2. Combination of production and ecology

Agricultural quality and the structural reform of agricultural supply-side will be reformed in the case of the penetrating contradiction between grain surplus and the lack of high quality agricultural products in china. Rural tourism planning is a scientific and reasonable regulation for elements refactoring and optimum combination of "production-life-ecology" space (Zhe C, Jian-ming C and Li C, et al,2016). Thus combined with the master planning, Baizhai village is planned to be a rural tourism base with green, ecological, quality as the direction of agricultural development, "creative experience of agriculture" as the theme. According to the topographic feature, the concept of "layer" is introduced into this planning to develop the agriculture, the main agricultural projects:

- Multicolored flower field -- developing grain and oil planting industry in the bottom of this village to form a farmland landscape with rural amorous feelings by growing wide areas of different varieties of the crops to bring visual impact for visitors and shape a natural landscape.
- Ecological fishery -- making full use of every pond in the village, breeding many kinds of fishes in the ponds, and carrying out simple ecological landscape design around the fish pond to form an ecological fish pond with function of ecology, leisure, fishing and sightseeing.
- Fruit & Vegetables picking -- planning develops high quality vegetables industry in the middle-low layer. Through planting vegetables that have both economic and ornamental value, we can create sightseeing and experiential garden, and form garden style farmhouse and experiential sightseeing garden.
- Sightseeing the sea of forests -- walnut industry which is the main economic crops of "One Brand for One Village" campaign of Baizhai village is in the middle-layer. The planning designs the

road landscape around the walnut forest to create an original forest landscape for visitors to ride, mountain climbing and other activities.

All sectors of the industry form a new agricultural sightseeing park with "sightseeing + agronomy experience + product sales". The planning makes the primary industry and the tertiary industry linkage through the development of agricultural tourism, to form the continuous and efficient "Blood Forming Pattern" [8] industrial development models (GU Zhe X N,2008). Eventually building a demonstration village in which eco-agriculture, eco-tourism and eco-economic are cyclic and sustainable.

4.3. Combination of life and ecology

4.3.1. Settlements planning. Reasonable farming radius can not only add the labor intensity but also output per unit time. Once the arable land beyond cultivated radius, time and labor and energy would be added, production reduced and economic benefits lowered (Qin-li Y, Cheng W and Fu-xia J, et al,2013). The settlements planning of Baizhai village is based on the reasonable tillage radius, in the case of guaranteeing residents to reach the cultivated land within 5-10 minutes and according to the formula:

$$S = V * H \quad (1)$$

S - the distance from the settlement to the destination

V - the driving speed of the tractor

H - the time to reach the destination

Taking V=30km/h, H=5 to 10min, the maximum value of the tillage radius of Baizhai village is 5km. Therefore, the tillage radius should be guaranteed in 5km and strictly enforced the planning requirements of "the improvement is the main and the new construction is auxiliary". The settlement planning adopts the principle of "relatively centralized, a small amount of scattered" planning and layout, forming a group layout. The layout type of architectural in Baizhai village is linear layout that the road serves the residents on both sides (Fig.7). The planning plans a center park near administrative center and medical center (Fig.8). The center square should have the nature of leisure and open to meet the needs of residents' parties and festivals. Several little parks were planned combining with public facilities in communities. For improving residents' participatory, the park design must be subject specific and interesting. Planning to build the courtyard space into a closed green space which integrates production, leisure and ecological functions. Take full advantage of the ponds to create a beautiful water landscape outdoors. To build a modern architecture with traditional features, vernacular dwellings of Baizhai village adopts the architectural characters of the northeast of Sichuan: wood structure, overhanging gable roof, small tiles, lime on wall, doors and windows in wood, column carved in stone, etc. These characters make buildings adapt to the terrain and rainy weather in the hilly area. Integrating a variety of functional spaces, such as kitchen, toilet, storage rooms, housing, sitting room, bedroom, dining room, etc. It is separating human and animal in the construction space layout. It also achieves the goal of building energy efficiency by designing good ventilation and lighting. Architectural is design for 3 to 5 people to live.



Figure 7 Architecture layout planning of Baizhai village.



Figure 8 Central square design of Baizhai village.

4.3.2 Infrastructure and public service facilities planning. According to "Opinions of the CPC Central Committee and the State Council on the implementation of the development of the new concept to accelerate agricultural modernization to achieve a comprehensive well-off target", the infrastructure construction which is supported by the country's fiscal should be focused more on rural areas and narrow the wide wealth gap between rural and urban areas by building, managing, protecting and operating well the rural infrastructure" (Feng tian Z,2016).To achieve the across of the new village to the new and beautiful village by promoting equalization of public services in urban and rural areas and improving infrastructure. Planning content contains:

- Improving the road transport network: to build the road system with a reasonable layout and clear road network by constructing village road and improving tractor road. Annular landscape road around the industrial belt and the dendritic road that leads to each community form the traffic system of Baizhai village jointly (Fig.9). In addition, to realize the goal that the traffic is 100% unobstructed, planning to perfect the incomplete road, and increase village road 25000 m, tractor road 12000. The safe distance of vehicles on the rural road is 1.0-1.5m, and the distance between vehicles and side ditches is 0.5m, according to the formula:

$$V = (A + B) M + C \quad (1)$$

A - minimum safe distance between vehicle and side ditch or side stone;

B - vehicle width;

C - meeting the minimum safety distance;

M - number of vehicle lane.

According to the actual situation, regulating $A=0.5m$; $C=1.0m$; $M=1.0$, then can calculate out the village roadway width of various types of vehicles (Tab.2, Tab.3).

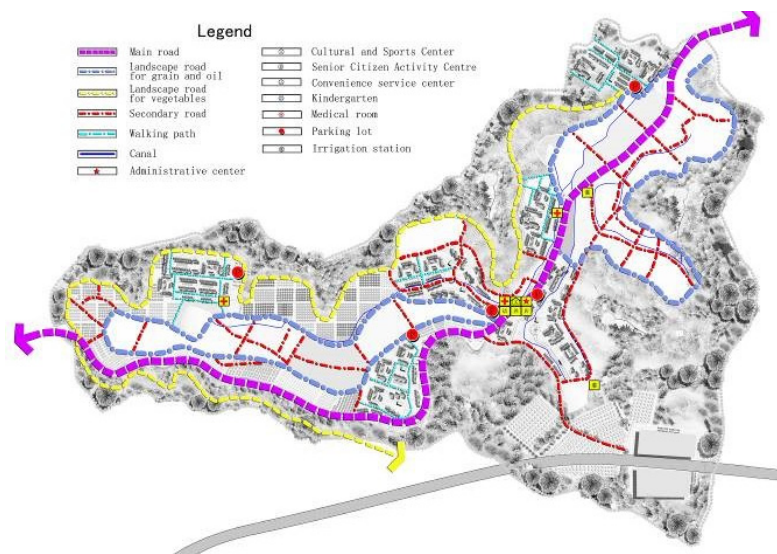


Figure 9 Infrastructure construction program.

Table 2 Road width required by various types of vehicles of Baizhai village.

Name	Animal-drawn vehicle	Bicycle	Motorbike	Tricycle	Vehicle
The width of vehicle (m)	1.6	0.5	0.8	1.1	2.5
The width of lane (m)	3.1	2.0	2.3	2.6	4.0

Table 3 Road width planning of Baizhai village.

Sort	The existing township roads	The existing village road	The planning township roads	The planning village road	The planning production road
Width(m)	4.5	2.5	4.5	2.5	2.5

- Water supply & drainage system design: the water supply network arranged along the road side and forms a formation of circular main line and dendritic branch pipe. The pipe diameter of branch pipe under the road is not less than DN100, and every 120m set a fire hydrant. The drainage system is ditch drainage system. Planning a 4500m long of ditch which is not less than 0.5 m of its width and depth. The main materials of ditch are brick and cement mortar, more than 5cm thick concrete is buried at the bottom. The domestic sewage is disposed by pushing into septic tank as farmyard manure or producing marsh gas. The production sewage mainly coming from mass breeding of poultry are recycled through building septic tank and the biogas digester by famers.
- Transformation of power supply facilities: based on "plan design guide for the rural electric power network" (DL/T5118-2010) to transform the electric power of Baizhai village, gradually abandoned the existing 35 KV substation of Longsheng town to rebuild a 110 KV substation which can meet the requirements of villagers. Power supply line adopts high pressure transmits electricity impracticably the line corridor mode, keeping width from 30-40m for 220KV, 20-25m for 110KV, 15m for 35 KV.
- Public service facilities planning(Fig.10): To improve business trade, leisure activities, management services, education and health care of Baizhai village, the village committee and medical center will refit a civilian service center about 150 square meters, an elderly activity center about 400 square meters and a kindergarten will establish; within the settlements several canteens and public toilets

are added properly for visitors. Greening all around the buildings and building space with the functions of fitness, leisure and entertainment, and the lights are arranged on both sides of the road. And achieve the improvement of public services such as commercial trade, leisure activities, management services, education and teaching, safety and health and other public services in the village.



Figure 10 Bird's eye view.

5. Conclusions

Construction of "Beautiful Countryside" is the objective requirement of developing ecological civilization society. The core of beautiful rural construction is to develop beautiful agricultural industry, new rural area scene and farmers' quality on the premise of sustainable development. It is efficient for beautiful rural construction by applying the concept "production-life-ecology" into rural planning.

Based on the concept, this paper puts forward the planning and transformation of the agricultural production, farmers' life and rural ecology in the village. In order to meet the timeliness of space planning and the efficiency of village development, the plan not only realize the prosperity of the village with the industrial economy, but also protect the ecological environment of the village.

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