

ECOLOGY, PRODUCTION AND LIVING: RESEARCH ON THE PLANNING AND CONSTRUCTION OF RURAL FEATURES BASED ON THE EPL SYSTEM

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ABSTRACT: Rural planning and construction carries influential natural, economic, social and cultural connotation. The problem of rural features deficiency has prevailed in current Chinese rural planning and construction practice. Based on the problems revealed in rural planning and construction process in Zhejiang Province in China, the article presented a way of recognizing different rural landscape styles, and put forward guiding ideas and spatial strategies for the planning and construction of rural features, from the perspective of ecological system, production system, and living system (namely “EPL” system). Such research might provide guidance for the current construction of Chinese rural features.

Keywords: Rural features and characteristics, planning and construction, ecological system, production system, living system.

INTRODUCTION

Rural feature is well-known as mirror to the expression of rural characteristics including natural, geographic, economic and social connotation. As it reflects the overall influence projected by both nature and cultural forces, the rural feature often holds a series of comprehensive attributes. Nowadays, the researches about rural features have drawn a wide attention by academics in fields such as architecture, planning, landscape, ecology, environmental psychology. Researchers often try to establish a direct connection between rural features and the core content in their principles. Architectural scholars consider the design factors (Wang et al. 2011) and construction patterns (Liu 2011) to matter in the process of rural features' formation. And the disposal of terrain and environmental image issues (Xu and Huang 2010) is the key expression. Meanwhile, the planners try to explain the relationship and mechanism between industrials (Li and Lou 2010), land-use layout (Li and Liu 2010) and rural features. Moreover, the landscape ecologists evaluate the performance of rural landscape features by analyzing the structure of ecological factors (Liu et al. 2006). Also, various methods are applied to discuss the cultural connotation (Jiang and Zhang 2004) and psychological meanings (Mo 2009) of rural features. The research angles above reveal a lack of consideration of the

integrity and the complicated interaction among the factors. In fact, the understanding of rural features should be built on the basis of comprehensive cognition about the whole rural system.

From a practical angle, up to now, there have been several movements of rural planning and construction that combined with the concept of “ecology, production and living” both in China and abroad.

As early as the 1970s, South Korea proposed the Rural Community Renewal Campaign which mainly focused on improving rural production and living. This campaign contains three targets including spiritual confidence, income growth and environment improvement (Li 2011), through the introduction of technology and specialized talents cultivation, production system innovation, and maintenance of natural landscape and creation of cultural atmosphere.

Since 1990s, Taiwan started “Rich and Beautiful Village” program and has achieved notable effects so far. It proposed the concept of “production, living and ecology”, which emphasizes the balanced development of economy, environment and culture (Ding et al. 2006). On the production section, it focused on creating economic vitality in rural areas and providing farmers with new employment opportunities. In living section, the opinions of local people were respected, the rural culture and living habits were taken consideration into planning and design, and residents were guided to

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actively participate in community construction. In the ecological section, biodiversity was stressed in rural construction to make the country present well-regulated ecological landscape and give birth to a fertile ecosystem.

In 2010, Zhejiang Province proposed the beautiful villages' construction plan and put forward the orientation of 'Eco-Agriculture, Eco-Tourism, Local culture'. It included eco-habitat construction, ecological environment enhancement, ecological economy promotion and eco-culture cultivation. And its specific measures emphasize on the support of science and technology and the construction of grass-roots organizations.

All these practices highlighted the concept of integration of ecology, production and living in rural planning and construction. However, these movements were attached attributes of government's policy documents. They focus on the introduction of new technology, establishment of the dominant position of the villagers, the excellent village competitions and other specific measures to achieve the improvement of rural environment and high quality of life. Rural features are just regarded as subsidiary of the results of these planning and construction operations, rather than initially guiding objective. The concept of "ecology, production, and living" is proposed as a guidance principle, though specifically how it will apply to the expression and creation of rural regional features is not involved.

Therefore, this article tries to compensate for the lack of systematic theoretical study of rural features. Drawing on the concept of "Ecology, production and living" mentioned in the Rural Community Renewal Campaign and "Rich and Beautiful Village" construction, the article attempts to explore the interaction between "Ecology, production and living" system and rural features, establishing the rural features planning strategies under the framework of ecological system, production system and living system (namely "EPL" system).

COMPOSITION OF THE EPL SYSTEM AND ITS ASSOCIATION WITH RURAL FEATURES

Interaction Between Ecological System and Rural Features

Ecological system includes climate, topography, hydrographic network, mountains, vegetation and other natural factors (Fig. 1).

Different combinations of these factors compose the base map of rural regional features, which not only play

a decisive role in the rural macroscopic appearance, but also reveal the mechanism of the regional resources utilization and development. Consequently, these combinations affect the socio-economic and living conditions of the countryside and shape the rural landscapes of various industrial characteristics and settlement patterns.

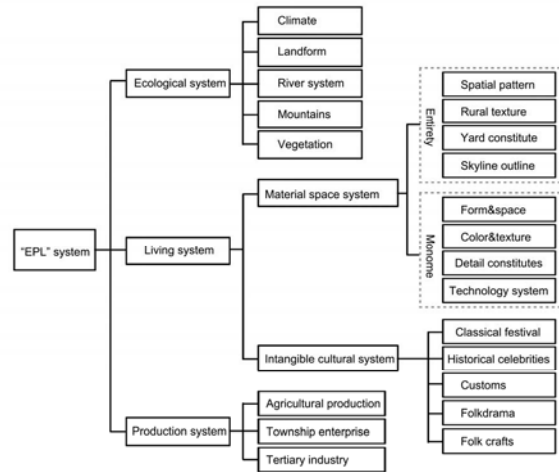


Fig. 1 Diagrammatic drawing of the framework of EPL system

Interaction Between Production System and Rural Features

Production system includes agricultural production, township enterprises, the tertiary industry and other factors (Fig. 1).

Agricultural production, which plays a dominant role in rural economy, is an intertexture process of economic reproduction and natural reproduction that relates to the landscape features of rural areas (Li and Lou 2010). The transformation of rural industries, such as the introduction of modern urban agriculture, rural industries, cultural industries, tourism, and other characteristic industries, will influences rural landscape, settlement pattern, architectural features and facilities layout in differential degrees, and finally products positive or negative effects to the changes of rural features.

Interaction Between Living System and Rural Features

Living system makes up of physical spatial system and non-physical cultural system (Fig. 1). Specifically, it includes settlement pattern, vernacular architecture, spatial environment and local culture which are based on villagers' logic of daily life in different regions.

Due to the constraints of geographical conditions and production characteristics of rural areas, the villagers

gradually develop their certain customs and behavior modes, thus forming a unique social network.

With the economic and social development, new construction system will be gradually introduced into rural areas, thereby bringing the application of new technologies and new materials. It is reflected as new settlement patterns, architectural forms and courtyard characteristics in space, thus affecting the inheritance of regional culture and the conservation of local features.

Internal Connection of the EPL System

These three interrelated systems, compose the main contents of rural features and characteristics (Fig. 2).

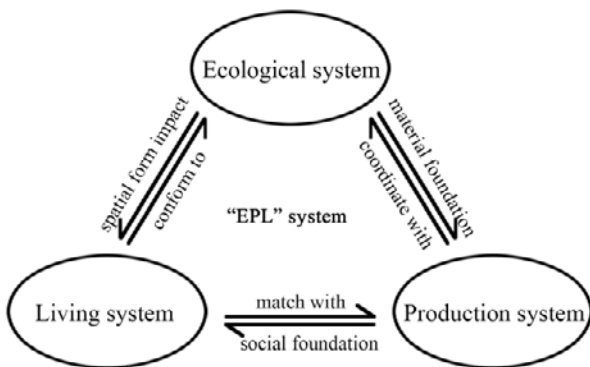


Fig. 2 Diagrammatic drawing of the internal connection of the EPL system

Ecological system and living system are the material and social foundations of production system, and form the environment of living and production. Ecological system and production system have influenced the establishment of rural settlement space and rural culture in both material and immaterial respects. They integrate the natural geography and local culture into the living system. Living system is the main spatial carrier for villagers to create material and spiritual wealth. Planning and construction generally work on the living system by seeking the optimal form of development on the basis of respecting regional natural features to meet the requirements of economic production.

In conclusion, these three systems interpenetrate and interplay with each other, and influence the formation of rural features and characteristics on the whole.

ANALYTICAL METHODS OF THE EPL SYSTEM

It mainly includes four steps to apply the EPL system into rural features planning.

(1) Recognition and extraction of the rural features elements: through on-site research, planners extract elements mentioned in the EPL system which can be found in the village and explain how they have influenced the current rural features, thus to determine the effect significance of every elements and find out the main factors.

(2) Classification of rural features type: According to the main factors, planners try to judge which features type under the three subsystems of the EPL system does the village belong to.

(3) Corresponding strategies: Strategies are proposed according to different rural features types to achieve the optimal allocation of features factors, thus to strengthen the identification, impression and perception of rural regional features.

(4) Implement the targeted strategies at various levels of rural planning and construction.

PRACTICE GUIDANCE FOR THE PLANNING AND CONSTRUCTION OF RURAL FEATURES IN ZHEJIANG PROVINCE UNDER THE EPL SYSTEM

Problems of Zhejiang Rural Planning and Construction

Polarized Misunderstanding of Rural Features Construction

At present, the polarized misunderstanding of rural features construction—building convergence and “thousands of villages with thousands of faces”—are pervasive in Zhejiang (Li and Lou 2010; Li et al. 2011).

Unawareness of the characteristics of different types of villages has led to the blind pursuit of successful cases, ignoring the unique regional culture and natural features. The deviation from the right path brings the phenomenon of convergence (Li 2004). The inertia of convergence has caused the spreading of same style and loss of characteristics of rural settlement. Furthermore, the unilateral procedure of apparent modification without consideration of deep connotation of rural features has just made the degeneration of rural regional culture and natural characteristics.


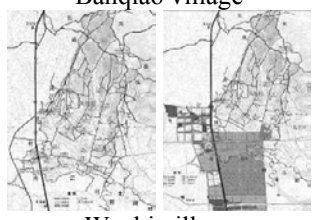

On the contrary, a lot of villages in Zhejiang have gone to the extremely opposite side in rural construction practice. Each village makes every attempt to create different features to distinguish themselves from the other ones, even the so-called style is completely against the environment and the culture. Pursuit of strange, unconventional form of renovation accompanied with the loss of authenticity of villages has made the rural areas far away from the features of country flavor. The

decomposition of rural settlement pattern and rural social network has result in the low rural intrinsic quality.

Emphasis on Shaping Dominant Imagery, and Neglect of Enhancement of Intrinsic Quality Elements

The current planning and construction of rural features and characteristics tend to focus on shaping the dominant image elements like landscape highlights, building appearance, while lacking concerns over intrinsic quality elements such as the cultivation of characteristic industries, ecological infrastructure and public service facilities allocation. Absence of study on the inner mechanism of the feature formation and characteristics has made the planning and construction practice fail to recognize various ecological factors and cultural connotation. The planning practice has done little contribution to maintaining the original rural texture and the organic layout style of villages (Table 1). Moreover, the inadequacy of infrastructure and public service facilities has also exerted influence to the development of villages.

Table 1 Problems of Zhejiang rural planning and construction and typical cases

Planning problems	Typical cases
Pursuit of a centralized layout effects and degradation of landscape types	 <p>Banqiao village</p>
Simulation of large scale and mechanized urban layout, resulting in the loss of features	 <p>Wuzhi village</p>
Disseveration of the originally continuous natural productive space landscape	 <p>Lang village</p>

Deficiency of Protection and Utilization of Rural Cultural Resources

Rural cultural context and its spatial organization have constituted a special neighborhood relationship, reflecting in the streets, buildings, environment, residents' living conditions and the unique folk culture activities which have more or less retained the traditional characteristics, showing a charming living atmosphere in pedestrian-oriented scale (Li et al. 2011). However, the current merging and resembling of villages pay little attention to the rural cultural context and relevant resources, resulting in no inheritance of the unique rural culture and the texture. At this point, the protection of rural cultural context has become a rescue project in the progress of construction of beautiful countryside in Zhejiang.

Rural Style Types Based on the EPL System

Based on the EPL system of the construction system of rural features and characteristics, the primitive types of Zhejiang rural features include (Table 2):

Table 2 Zhejiang rural features types classified under the view of "EPL" system and corresponding typical cases

Classification perspective		Rural type		Typical Case
Ecolo gical persp ective	Hilly-type	High canyon type		Shangge village
		Low hills type		Lang village
		Plain valley type		Zhangli village
	Plain-type	Plain water-grid type		Tangshang village
		Alluvial plain type		Lianxing village
	Island-type	Erosion hills type		Maoshan village
Produ ction persp ective	Agricultural type	Traditional agricultural type		Banqiao village
		Modern agricultural type		Xiatang village
	Industrial type		Dahe village	
	Historical and cultural type		Yanwashan village	
	Leisure and tourism type		Yutangyuan village	
Living persp ective	Stripe-type		Huanggang village	
	Tentacles type		Dahe village	
	Cluster type		Lang village	
	River type		Zhangwan village	

- (1) Ecological perspective: hilly-type, plain-type, island-type and other categories (Fig. 3);
- (2) Production perspective: agricultural type, industrial type, historical and cultural type, leisure and tourism type and other categories (Fig. 4);
- (3) Living perspective: strip-type, tentacles type, cluster type, river type, and other categories (Fig. 5).

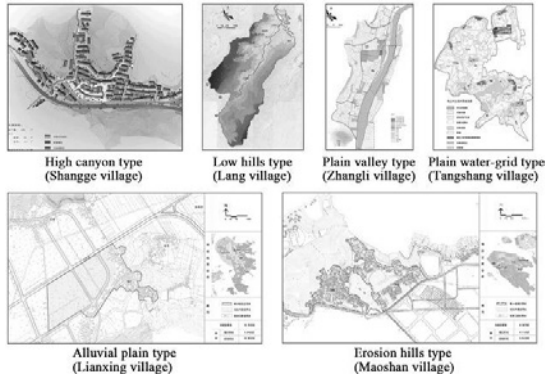


Fig. 3 Typical cases of rural feature types in ecological perspective

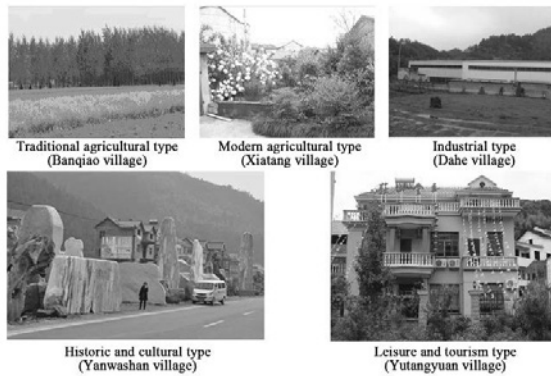


Fig. 4 Typical cases of rural feature types in production perspective

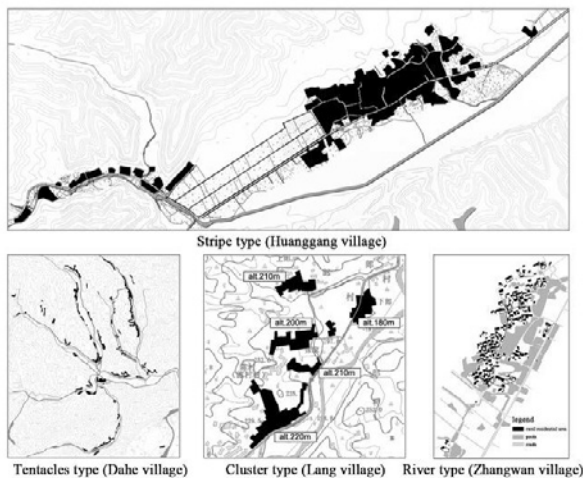


Fig. 5 Typical cases of rural feature types in living perspective

Planning and Construction Strategies of Rural Features and Characteristics

Planning guidance of features and characteristics under ecological perspective

(1) The overall environment: lay focus on maintenance of ecological integrity and authenticity, and coordinating the figure-ground relationship

Considering the overall rural environment, planning needs to focus on the environmental protection and the sustainability of the ecological texture, guiding and controlling landscape character mainly from three aspects, pattern of landscape ecology, biodiversity and development intensity.

In landscape ecological pattern respect, planning needs to strictly control the damage behavior to the terrain, to ensure the integrity and continuity of the topographic condition, to restore the original landscape pattern, and to coordinate the figure-ground relationship of the village and its surroundings (Theobald 2005; Yao 2012; Zhou 2000).

In biodiversity respect, planning should pay attention to tailored protection for the precious trees, in order to maintain the authenticity and integrity of the original ecology (Theobald et al. 2005). Also, measures should be taken in protecting and restoring the bamboo groves and woods, which might play critical ecological function in the process of water conservation.

In development intensity respect, planning needs to control the density of the village buildings, to strengthen the characteristics of the natural elements within the village. At the same time, the intensity of tourism development for tourism-oriented villages should be adjusted carefully in the pursuit of harmony between the environment and the style of physical facilities.

(2) Mountains: rely mainly on protection while making restoration subsidiary

Considering the rural mountainous landscape, planning needs to give priority to protection principle to guarantee the forest coverage, while appropriately increase the richness of vegetation and repairing the broken face of the mountain via vertical greening or other technical means. Secondly, it is necessary to control the rural construction in planning to slow down the erosion process with the aim of maintaining the integrity of the mountains. Also, the restoration and protection of mountainous vegetation might help hold the water in the earth and reduce the risk of geologic hazards such as landslides and collapse.

(3) River system: maintain the ecological originality of the water body, and focus on the diversity and localism of waterfront landscape

As to the river system of mountainous and hilly areas, planning needs to ensure the connectivity and originality of streams.

To the plain region of rivers and lakes, measures should be taken to maintain the natural form and landscape characteristics of the aquatic network. And the village layout should be suitable with the water network to keep its overall hydrophilic characteristics (Li and Liu 2010). The river course should not only give consideration to the visual landscape but also meet the requirements of water conservancy, making full use of ecological adjustment function for natural river bed and revetments.

Ecological corridors in the form of farmland, green belt or forest belt are also needed to thread the landscape on both sides of the river together and provide a solid foundation for species richness and local favor.

(4) Island: pay attention to the island's bearing capacity, to create the characteristics of the marine village style

To island or marine areas, planning should pay attention to the sustainability and controllability in the construction process of villages, emphasizing the island's bearing capacity conditions and the fragile characteristic environment. Therefore, tactics should be taken to protect the original vegetation, river systems and topographical condition of the island villages as far as possible, while making the best use of the landscape and improving the entire quality of the habitat.

Because islands are faced with the situation of large population with relatively little land, the village's layout should continue to reflect the compact characteristics of building houses on the hillside as far as possible, leaving the maximum space for agricultural or industrial development. Furthermore, by showing the special landscape of alluvial regions and the unique seafront facades of hill-scoured villages, the coastal villages have gained a distinctive name card for the construction style in eastern part of Zhejiang Province.

Planning guidance of features and characteristics from production perspective

The overall planning thought emphasizes the compatibility between industrial activities, landscape values and functions.

(1) Agricultural village: rationally utilize agricultural resources and coordinate the relationship between protection and development

In the dynamic process of the rural landscape pattern, industrial development should be adapted to local conditions, giving full play to local factors and characteristics. The development of urban agriculture should be based on service-oriented agriculture and

consumer-oriented agriculture, while complemented by various forms of agriculture which include eco-agriculture, sightseeing agriculture, three-dimensional agriculture, leisure-oriented agriculture, experiential agriculture and export-oriented agriculture (Jing 2003; Li and Lou 2010). Such strategy might help to establish a modernized efficient agriculture in harmony with the development of human and nature.

Regarding the ecological balance in a wider range, mountainous and hilly regions should annotate the big agriculture idea and develop comprehensive management according to their own natural features (Liu 2002; Jing 2003; Li and Lou 2010).

Mountainous and hilly regions should establish the main body of the rustic landscape, plant local tree species and gradually improve conditions for agricultural production, with the aim of increasing the potential for agricultural development to achieve the overall growth of rural economy. Plain areas are suitable for development of the new landscape mode called 'farmland garden' by making use of tea garden landscape, bamboo garden landscape, flowers and trees base and so on to develop leisure and sightseeing agriculture (Zhao 2010; Li 2010; Li and Lou 2010).

(2) Industrial villages: focus on the protection of the integrity and completeness of the village natural landscape environment

This kind of village should protect the local natural environment and geographical landscape by correctly handling the relationship between the recent construction and long-time development.

The balance between the reasonable exploitation and cautious restoration plays vital role in preservation of the surrounding. Strategies adopted in the township enterprise region should vary from the ones in original living habitat so that the original character and scale of the villages would not be disturbed. What is more, by retaining original forms of roads, water network, patterns and vegetation, the natural original feature of rural landscape must be conserved. The sustainable villages which blend smoothly with the environment and local rural texture would avoid the occurrence of so-called 'non-urban, non-countryside' phenomenon (Li and Lou 2010). In that case, the integrity of geographical ecological pattern would be kept to the great extent. And the villages might gain stability and diversity of the natural ecological functions.

(3) Historical and cultural village: focus on the heritage of local architectural features and the landscape pattern of villages space

These villages should give priority to protection of historical style and maintenance of traditional houses, combined with the organic renewal of the village

construction. The new buildings should respect the original space scale and texture of the village, making the space form fully blended in the environment. The shape, layout, construction, materials, scale, construction technology and the overall atmosphere of the building should not just organized in the facade adornment. Instead, the deep-level content of rural culture should be explored under the purpose of promoting the whole culture atmosphere and carrying on the heritage of villages. By dealing with village's original architectural form, spatial composition and courtyard layout, these villages might maintain the architectural culture and reshape the village features.

(4) Leisure and tourism village: rationally develop ecological resources and expand the connotation of ecotourism industry

As to this kind of village, it is crucial to control the scale of the tourism industry and prevent over-commercialization. Attentions should be paid on the conservation of local landscape and the maintenance of original ecological characters, especially on the scale and proportion of the artificial landscape. The layout of the tourism facilities, the architectural style and the new functions should be in harmony with the old villages, realizing the aim of a continuation of the village context and the natural spatial growth. The development of the tourism industry could not only become an indispensable part of the natural environment, but also play an important role in optimizing local resources and inheriting the local culture.

Planning guidance of features and characteristics from living perspective

The basic principles of the guidance of living space features and characteristics include four aspects: natural production, urban and rural differences, economic applicability and rural harmony.

Principle of natural production: the guidance of village form must lay mainly on the preservation of rural characteristics, showing respect to the nature influence and agricultural production process. And overall consideration of the villagers' productive, living and ecological needs must be taken to avoid separation of these three factors.

Principle of urban and rural differences: to guide village form according to specific geographical features, the rural folk culture, topographic condition and environmental vegetation. Form the unique village space structure significantly different from the city space with full respect for cultural traditions and natural environment.

Principle of economic applicability: the guidance of village form must take into account the affordability of

the construction, regarding availability as the fundamental starting point. Reasonable layout should be introduced to meet the need of rural life, production and environment. The relocation and style transformation of rural residential areas should be cautious to avoid flashy content and formalism.

Principle of rural harmony: the guidance of village form must be adhering to characteristics of adjusting measures to local conditions, using local materials and the traditional rural civilization of frugality and nostalgia, to construct the most economical and ecofriendly beautiful countryside.

Policy suggestions for rural style remediation and construction

Expedite the preparation of rural features and characteristics guide, Zhejiang Province

This article suggests that the government of Zhejiang Province work out programmatic planning guidelines, which might annotate the general content and detail requirements of the special planning for rural construction in the county level and village level.

It is also recommended that the technical guidance for planning and construction of rural features in village level should be formulated. The context of the guidelines could be divided into two levels including the built environment and facilities environment. On the one hand, the built environment includes two levels of overall and monomer. The overall level includes four construction elements of color, contour, unit and scale. The monomer level includes four construction elements of roof, walls, materials, detailing and construction techniques. On the other hand, the facilities environment includes six construction factors of roads, square nodes, landscape architecture facilities, maintenance facilities, sanitation facilities and vegetation cover.

Strengthen technical training and construction of demonstration projects

In order to popularize the beautiful village construction program, it is recommended that technical training and example projects should be taken as important part in the whole process of implementation

On the one hand, the appliance of innovate training methods and training projects for officials and technicians would not only accelerate the transformation progress from quantitative and physical planning to comprehensive planning, but also speed up the cultivation of technical service personnel and guidance system. On the other hand, through diverse research programs and different kinds of example projects, rural planning might gather strength from all sides to focus on

the planning formulation and implementation process, in order to provide paradigm and practice experience to realize sustainable development objectives of Zhejiang rural residential environment construction.

CONCLUSIONS

Through the review of existing rural features research and practice, the article pointed out the lack of systematic theoretical study of rural features and the insufficient attention to the interaction between “Ecology, production and living” system and rural features in practice.

With analysis of the EPL system’s association with rural features, the article proposed the framework of planning and construction of rural features under the perspective of “EPL” system—ecological system, production system, and living system, and provided the analytical methods to apply the EPL system into rural features planning.

The article then took Zhejiang Province as example. After explaining various categories of Zhejiang rural features types based on the EPL system and corresponding construction strategies, the article finally put forward several policy suggestions to guarantee the implementation of rural planning and construction. This attempt may provide systematic route support and strategic guiding function for the planning and construction of rural features practice.

Since the article mainly focused on the whole framework of the rural planning from the “EPL” system perspective, many other factors which may cast influence to the planning procedures are not taken into account. With GIS tools, statistical methods and other technologies, the more typical and complex categories of rural feature style could be analyzed and represented through the spatial visionary images.

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