The Collaborative design of rural Morphology reconstruction and paddy rice flower co-production Environment

Wang Yao*
School of Fine Arts, Yunnan Normal University, Kun Ming 650500, China

*Corresponding author: 722@ynnu.edu.cn

Abstract. A rural environment is one that has been transformed by man, during the process of transformation; rural morphology is influenced by crop type, agricultural production mode and cultural morphology. After that the research on human-land relationship in the field of architectural planning gradually turn to the analysis of spatial forms such as landscape and topography, and ignore the influence of crop types, production modes and cultural forms. Co-cultivation of rice flower achieves the maximum and most reasonable utilization of environmental resources and tourism intervention to obtain sustainable benefits within the limited time and space. It is an important basis for promoting the transformation of rural form, the inheritance of cultural form, and the collaborative design of rural natural environment.

Keywords: Village form; Rice and Rapeseed flowers co-cropping; Environmental collaborative design.

1. Introduction

In recent years, more and more attention has been paid to the construction and development of traditional villages, however, most regions from the perspective of the needs of urban people (outsiders) focuses on the architectural or historical value of buildings and Spaces during the protection and development of traditional villages, and gives little consideration to the "people" who living in traditional villages; only regard the local traditional folk customs and rituals as "performances" to meet the needs of foreign tourists for sightseeing (curiosity), while ignore the further exploration and development of traditional folk customs. In this way, the traditional elements such as folk custom and ceremony will lose their inner spirit constantly, more and more isolate from the life of the local people, make the traditional villages with the shape of tradition, but without practice tradition. some regions even appear the phenomenon of excessive commercial development and "disorderly creative", which caused the destruction of traditional villages.

The conceptual attraction of the construction and development practice of traditional villages not only lies in the dependence of "rural construction" on government investment, it is almost inevitable to find another way out of the pattern of "thousand village has the same situation" standardized new rural construction projects. Government projects to build new villages are often crude, by means of "fund transfusion" and "spatial migration" of residents complete rural reconstruction and economic development promotion. Due to the lack of concern for the culture and historical context that is truly
based in rural communities, the actions further damage the cultural ecology; especially enhance the sense of alienation between people and the original social space and living space [1].

The value of traditional villages lies in the fact that they are a kind of ecological system integrating nature and humanity, which has been accumulated and formed in human production and practice for a long time, full of rich historical information and cultural memory, and still needs to adapt to nature and local conditions. This is not only the building wisdom of the ancestors, but also the key to the integration of traditional villages and natural environment [2]. Take village as the center of a system of ideology and the corresponding social practice, promoting rural social and cultural value, economic value, and corresponding with the urban and industrial socialist ideology [3], through activating village form, cultivation mode of production and environment provide new respond for the future traditional form of new rural construction design innovation.

2. Analysis and research of paddy rice flower (rapeseed flower) co-cropping type and production mode

2.1. Yunnan Luoping minority rice flower (rapeseed flower) co-cultivation is a prominent feature of rural morphology

Terraced paddy rice flower (rapeseed flower) co-production is the root of Miao people's livelihood. Combining the spatial characteristics of the terrace with the temporal characteristics of the rape flower has become the basic temporal and spatial rhythm of the local people's production and life. The demand for spatial and temporal management of terrace rapeseed flower has exerted a profound influence on the settlement and shaped the characteristics of fixed farming radius, small scale but high spatial aggregation of Miao nationality settlements. The rapeseed flower production rhythm also resonates with the village festival ceremony and the villagers' life rhythm, and the ceremony space associated with the elements of paddy field system also becomes the key node of the topological space form in the village. With the acceleration of the urbanization process, in the past two decades, rapeseed farming with its remarkable landscape of flowers and sea has driven a large number of industries, such as tourism, rapeseed processing industry and bee industry flourish development, and has become an important industry in the economic development of Luoping.

2.2. Analysis on the tillage Pattern cycle and tillage rhythm of Rice flower (rapeseed flower) co-cropping in Luoping Ethnic Minorities

The rapeseed planting scale in Luoping area is expanding continuously, radiate from the dam area to the mountainous area, the area develops from less than 150,000 mu in 1999 to 800,000 mu today. In 2015, the output of rapeseed was 138,000 tons, with an output value of 600 million Yuan. More than 30,000 tons of rapeseed and 12,000 tons of rapeseed oil were used for processing. The output value of rapeseed was nearly 200 million Yuan. The number of tourist visitors increased from 350,000 in 1999 to 1.8 million in 2015, and the comprehensive tourism income increased from 50 million in 1999 to 1.75 billion in 2015. Rape flowers generally in the year in March, April, flowering phase about 30 days, if the temperature rises quickly, flowering time will be a little earlier may be bloom in the end of February; if persistent low temperatures occur, flowering will occur later, probably in mid-March. In Luoping, Yunnan, rape flowers bloom from January to February.

2.2.1. Plowing and sowing. The land on which the rapeseed flowers are grown is flat and the soil should be fresh and soft. On the high altitude and barren land, should select the hybrid varieties with winterness, cold and drought resistance; In the soil fertilizer, water sufficient ground, should select the seeds with winter or half winter, strong resistance to disease varieties. Rape flowers are generally planted in September - October, the specific sowing time may be different from place to place. It can be broadcast, or seedlings can be transplanted, when sowing or
transplanting, the distance before each column should be appropriate for later hilling and harvesting. Generally, 200 grams to 300 grams are planted in one mu, leaving 8,000 to 14,000 seedlings.

2.2.2. Management The rape flower should be fertilized once when sowing or transplanting, If it is direct broadcast, the seedlings should be timely thinning, If the seedlings are transplanted, should be timely replenishment; Before the soil freezing, should take anti-freezing measures, can hilling, cover the soil, etc.: after turning green, topdressing and weeding should be done in time: should also sprayed drugs to control pests and diseases.

2.2.3. Harvest. Rapeseed flowers usually expire in March and April and go to seed, harvested in May Generally is in the morning when the dew harvest, harvest time is 80 maturely is better, after the harvest 4 ~ 6 days, choose in the sunny weather spread in the sun, grinding, threshing, Yang Net, when the water drops to 8-9% can be stored. In Luoping County, Yunnan province, more than 1 million mu of rape flowers bloom every year from January to March [4].

2.2.4. Paddy rice (rapeseed flower) co-planting - After the second harvest before winter, the rice field will enter the body tillage period in October-November. After 40 days, the rice field will be full of rapeseed flowers. The most main rape as green fertilizer plants, organic fertilizer to use. Form the cultivation pattern of rice flower and rapeseed flower co-cropping.

3. The cultivation of rice flower of Luoping ethnic minority is the key factor to form the spatial pattern of settlement;
As the basis of the livelihood of Luoping ethnic minorities, the spatial characteristics of the terrace combined with the temporal characteristics of rapeseed flower and rice cultivation have become the basic temporal and spatial rhythm of the local people's production and life. The need for time and space management of terraced fields has exerted a profound influence on settlement and shaped, formed the characteristics of fixed farming radius, small scale but high spatial concentration of Luoping ethnic minority settlements. The production rhythm of rice and rapeseed flower also resonates with the village festival ceremony and the villagers' life rhythm, and the ceremony space associated with the elements of the terrace system also becomes the key node of the topological space form inside the village.

3.1. Paddy rice flower cultivation ecosystem
In the process of domesticating mountain forests, ethnic minorities have created the classic four-element isomorphism pattern of paddy fields with rice and flowers: A complex system of forest - valley - village - terrace (FIG. 1, 2). There are 8 ethnic groups living in 3 natural villages, including Miao, Yi, Buyi, Han, Bai, Hani, Dai and Zhuang, near Tangli Concave Village in Luoping, the altitude of the village range is between 750 and 1664m, among which the altitude of the village is about 1664m. Above the village is the forest, a hundred thousand mountains are also here, the forest are worship and protected by the villagers generation by generation. Below the village is the Paddy field, which is about 750~1664m above sea level. In the four-element isomorphic system, the forest at the back of the village has the functions of conserving water, preventing soil erosion, and providing wood and wildlife resources; The tillage system is the main place for the use of heat and light and water resources, providing a place for farming food and vegetables, raising fish and ducks and other livelihood activities in the village; The water system runs through the whole ecosystem, and the water cycle is completed by forest water storage, irrigation of terraces, and evaporation after flowing into rivers: The village is where the villagers rest and live. The co-cultivation of rice is the result of the Miao people's reconstruction of mountains and optimization of water resources to support their agricultural livelihood, Paddy
rice co-cropping system is successfully embedded into natural ecology, which is a model of
docking and adaptation between artificial agricultural production system and original ecosystem.

![Figure 1. Quaternary isomorphic environmental system](image)

The environmental system of forest, rural spatial form, rice cultivation terrace and river valley in
Luoping Tangli Concave Miao village.

In the system shown in Figure 1, we can see that the rural spatial form is formed according to
the paddy tillage system, such an environmental system is more in line with the rational
utilization of natural resources through a reasonable allocation and combination of forest and
water natural resources [5].

3.2. Production coordination and spatial form of terrace farming
The particularity of terraced rice field makes collaboration greatly increase returns become
possible. On the one hand, water resources and mountain terraced fields make people have to
share resources and cooperate; On the other hand, the mutual assistance of labor can alleviate to
some extent the demand of rice on the extremely uneven distribution of labor force in time.
Production collaboration takes place at multiple scales within households, within villages and
between villages, and the village becomes the basic unit that sustains the entire system of rice
terraces. Agricultural cooperation brings about the integration of society and space, forming a
social structure closely related to rice cropping adaptation and a highly clustered village spatial
form.
Figure 2. The circulation of environmental system of forest, rural space form, paddy field

The circulation of environmental system of forest, rural space form, paddy field and river valley of rice cultivation, water resources are fully utilized, and the circulation system of harmonious utilization of environmental resources is determined by the rice cultivation system of rural form.

4. Agrarian Festival ceremony and village spatial structure

Following the rules of historical circulation and inheriting the festival, there will be a special ceremonial space when there are festival ceremonies. Ritual space forms the structural nodes of space and cultural cognition in each village. Although the shape of natural villages near Luoping Tangli Concave Village is different, the internal structure is similar and relatively simple, as to function, it can be divided into three categories: basic living space, ceremonial space and public space. The living space consists of courtyards with an area of 16m×8m at the base, which are closely arranged along the terrain and relatively homogeneous. There is no obvious difference in the area, orientation, and connection degree of main roads of each household. The compact interior space of the settlement has few open spaces, and the public space as the meeting place of adult men is usually located at the entrance of the village or the well. The ritual space inside the village, also known as the sacred space, is mainly used to offer sacrifices to mountain and river gods, mill autumn field, god Wells, sacrificial drum gods and village gate, which constitute the important nodes of the village spatial structure. These spatial nodes not only echo the "four elements" of the terrace system, but also coincide with the ritual activities of rice cropping [5].

4.1. The spatial and temporal correspondence between the village node and rice cultivation in terraced fields

Offering sacrifices to mountain and river gods, grinding autumn fields, Wells of gods and grain gods are important ceremonial places and sacred spaces in the village, which define the boundary and structure of the whole village, they correspond spatially and symbolically to the four elements of the paddy tillage system. Offering sacrifices to mountain gods is at the top of the village, close to the forest, which is the main place for foretelling a new spring ploughing festival and offering sacrifices to mountain gods, It will be established at the earliest site of the village, which is the beginning of the village, and the most sacred place of the village, people and animals are forbidden to come close at will on normal day. Moqiu field is located on the lower level of the village, which is the node where the village ends and the terraces begin, and also a symbol of the construction of Miao villages, become a prayer harvest Miao King festival worship carnival of the main site. There are usually have multiple Wells, but only have one god well, not only as daily water intake, but also as a place to worship the water god, which can bless the village and keep the water flowing for irrigating fields. The upper and down village gate is
located in a distance away from the village, and on the road of leading to the next village or plowing, define the basic boundary between the village and the outside. When built the village gate, dogs were killed and the border of the village was marked with dog blood and with wooden buildings, which became the boundary between human beings and natural elves, leaving the village gate is no longer a residential space protected by the gods, and the impurity and the accidental dead will be kept out. All natural villages have the same spatial structure, which is take upper and lower of village gate, the mill autumn field, the god of mountains and rivers, and the god well as the nodes, while more homogeneous living space will be topological into different forms of specific forms. It can be said that the spatial node of gods corresponding to paddy field elements dominates the spatial structure of the whole village and the villagers' cultural cognition. In addition to, as the main place of festival and ritual activities, they also embody the harmony of rice planting rhythm, villagers' work and leisure and village public life. Thus, rice paddy cultivation and production and village life form a strong space-time resonance [5].

5. Rural spatial form construction and tourism intervention

Moderate tourism development in traditional villages can not only increase the income of local governments and residents, enable them to have more financial resources for infrastructure construction such as roads, electricity and the Internet, but also can repair and maintain the traditional buildings in disrepair and revitalize the traditional customs and handicraft industry; Moderate tourism development in traditional villages can not only show and spread its value to tourists, but also can avoid the hollowing out of villages, protect its culture and continue its vitality [6].

During the process of rural tourism development, first should protect ecological environment and highlight cultural connotation; Second, should establish village planning, enhance its value; And meanwhile should attach importance to rural governance and promote economic development. Truly embodies the protection principle of "historical authenticity, feature integrity and life continuity" [7]. In the process of rural reconstruction, traditional buildings should be protected on the basis of protecting the original architectural space form, while when constructing public space should emphasize the activity space of traditional local customs and folk customs as the construction key point, for the intervention of tourism, the whole system has a linear structure and multi-core node mode, which should present a closed route of rice flower farming culture, folk culture and tourist attractions, the intervention is limited and maintains the integrity of the environmental coordination of the entire paddy field system.
In maintaining the rural spatial form, it integrates farming culture, rural public ritual activities and other core points to form a circular tourism route with natural form, architectural form and cultural form.

Through the narrative movement track of folk stories, the folk culture is transformed into the spatial form, and part of the architectural form in the village is transformed through the movement track, so as to make the cultural form with the characteristics of readable and spatial, enhance the interest of the whole route.

6. Conclusion
As all mentioned above, the study of Miao Tang Li concave Natural Village indicates that the settlement space forms a certain type with the natural ecology, crop production and cultural
ceremony. It can be said that human settlements are the result of the "coevolution" of ecology, production, society, culture and space [10]. We advocate the holistic perspective of rural settlement space research. This integrality includes two aspects: one is crop production and the integrity of village society. The terrace rice demand for unsegmented water resources, coordination of agriculture, mutual assistance in production and sharing with terrace infrastructure make a certain degree of settlement, cooperative organization of production and social cultural integration become necessary, the cultural structure and social differentiation resulting from rice production management are also reflected in the spatial structure of the village. Secondly, it is necessary to establish the integrity of time and space in the study of rural settlements, that is, to reintegrate time elements into the study of space. It is precisely because terraced fields and rice cropping are interwoven in spatial and temporal dimensions that Miao rural settlements present various complexities that can be studied and excavated [9].

The "harmonious rhythm" formed by the long-term running-in of rice and flower cultivation in terraced fields is determined and achieved by a relatively stable spatial pattern. Therefore, we can see that the settlement space and the village live in the labor space (terrace), the rest space (house and living space) and the "pleasure" place (the ritual place marking the labor-rest time node, which is also the sacred space node) in a certain structural and rhythmic way [5]. The form is the architectural space form, the cultural sacrificial form, the natural environment system composed of mountains, flowers, water, and people's great geomancy, magnificent of the atmospheric field.

Acknowledgments
This paper is one of the phased achievements of the scientific Research Fund project of Education Department of Yunnan Province, "Research on Parameterized Map Certificate based on Traditional Folk Art in Yunnan and Design Innovation of Modern Articles for Daily Use -- Taking Huaining Pottery as an Example" (Project No.: 2019J0107).

References
[1] Wang Bin, Wan Chen, Long Wenjun Guo Jinxiu, exploration and reflection of the protection of traditional villages - jixi is based and buried hill wan jian village, the village survey [OL]. HTTP://www.sohu.com/a/329742087_819998
[2] Li Geng, Feng Sha, Zhang Hui, Anthropological Frontier Observation practice of Artistic Participation in Rural Construction [J]. National Art. 2018. 03.
[3] Li Xiaoyun, New Rural Doctrine -- From transformation and deprivation to "Rural Stance". [J]. Cultural aspect. 2018. 02.
[4] When do the rape flowers come out? Its growing method is introduced. [OL]. Agricultural network. https://m.my478.com/baike/20200915/41740.html
[5] Liu Chaoqun, Wang Yijia, Zhu Zhu, How crops Shape Settlements -- Taking Wana Village, Lychun County, Yunnan Province as an example [J]. Journal of Architecture, 2020. 06
[6] Yin Hang, Exploration and Analysis of Traditional Village Style Renovation Planning in Tourism Development. [J]. Shanxi Architecture, 2013
[7] Jin Xin, on the protection and development of traditional Villages from the Perspective of Tourism Development of Lugu Lake. [J]. Journal of Central South University of Forestry and Technology: Social Sciences, 2019
[8] Katie Gardner, David Lewis, Anthropology, Development and postmodern Challenges [M]. Translated by Zhang Youchun. Beijing: China Renmin University Press, 2008.
[9] Yang Jisheng, An Analysis of Various social strata in Contemporary China. [M]. Lanzhou: Gansu People's Publishing House, 2006.
[10] Zhang Xiaochun Tang cones, developed anthropological historicial investigation into the rural transformation. [OL] China paper network. https://www.xzbu.com/2/view-5361172.htm