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# A Study on Schematic Language of Cultivated Land Form in Linpan, Western Sichuan

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**Abstract.** Cultivated land is not only provided with the attribute of natural landscape, but also the carrier of means of production and social form. Some characteristic forms of cultivated land have become the common heritage of human cultural landscape. In recent years, with the change of land circulation and people's modes of production, the cultivated land form has gradually lost its original characteristic texture. Therefore, how to protect and extend the cultivated land form needs urgent attention and research. The survey selected the existing remote sensing image of Dujiang Dam by Local Space Viewer, interpreted and extracted the schema of cultivated land form in Dujiang Dam, drew the schematic language such as "characters", "words" and "phrases" according to its scale, and analysed its landscape ornamental value. Then, historical remote sensing was used to analyse the change of cultivated land form in Dujiang Dam, and field investigation and questionnaire distribution were combined to seek the cause and result of the change of cultivated land form. These provide support for future landscape aesthetics research.

## 1. Introduction

The cultivated land form is formed during the long-term evolution process with the interaction between human being and land in a specific area, which carries the cultural phenomenon of the unity of natural and humanistic processes on the land [1]. However, with the development of social economy and technological change, the cultivated land form shows fragile characteristics. Chengdu puts forward the long-term goal and historical orientation of building a modern idyllic city in the world. Among them, it not only implements the Red Line basic national policy of protecting 1.8 billion mu of cultivated land without fail, but also further promises to protect the historical and cultural relics of Dujiang Dam self-flow irrigation area. The protection and continuation of cultivated land form have become an important value of schematic language research and its application.

In recent years, cultural landscape has become the research field with rapid development [2], and schematic language has become the scientific frontier of landscape architecture [3]. The preservation of traditional regional cultural landscape is the key to the local construction of landscape architecture [4]. The local recognition has gradually changed from the regional cultural characteristics with architecture as the core to the regional cultural characteristics with the land using mode of traditional



regional landscape as the core. Schematic language is a new paradigm for expressing landscape locality and spatial logic [5]. The theory and method of landscape schematic language help to realize the inheritance and innovation of landscape locality [6]. However, cultural landscape has regional characteristics, and there are different cultural landscapes in regions with different regional cultural characteristics, which leads to inadequate research on landscape language in most areas of China. The study on the schematic language of cultivated land landscape in Dujiang Dam is of great value to the supplement of landscape language.

Dujiang dam belongs to the self-flow irrigation protection area, which has a profound historical and cultural background, fully reflects the impact of human activities on nature, and has typical productive landscape space of "Linpan in West Sichuan", therefore, this study selected the plain area of Dujiang Dam City as the research area. Through the investigation and study of cultivated land form, this thesis reveals the unique land environment characteristics of "Linpan in West Sichuan, reveals the humanistic and cultural characteristics of Shu, excavates its aesthetic and ornamental value, and further explores its profound cultural connotation. It fully displays the cultivated land form, business form, cultural form and ecology of Dujiang dam self-flow irrigation area.

## **2. Schematic Language of Cultivated Land Form in Dujiang Dam**

### *2.1. Definition and Classification Method of Cultivated Land Form's Schematic Language Research*

#### *2.1.1. Definition of Cultivated Land Form's Schematic Language*

The study of land form schematic language is to select existing remote sensing images, through interpretation and pattern extraction, and express the schematic language through color and lines. [1] Land form units design vocabulary from its composition to the combination of land units, and it is based on the cultivated land form schematic language system from three levels of "character", "word" and "phrase" of land form landscape. Main research subject of land form schematic language are different cultural landscape space, different geographical types, different geomorphological characteristics and productive lands with different planar forms of different agricultural production modes.[1] This thesis takes Dujiang Dam as an example, mainly taking cultivated land form as the main type of land form, extracting the schematic language such as "characters", "words" and "phrases" to study the corresponding spatial pattern of land form formed in the ecological process through interaction between nature and culture.

#### *2.1.2. Classification Methods of Cultivated Land Schematic Language*

- **Classifications and Forms of Cultivated Land:** According to the topography of Dujiang Dam and the main types of cultivated land utilization, cultivated land is divided into fields, fish ponds and Linpan. Due to the inherent relationship between cultivated land types and cultivated land forms in Dujiang Dam, the types of cultivated land depend not only on the natural environment and the economic structure of regional society, but also on the historical culture and land policy.
- **Ways of Schema Prototype and Schematic Language Extraction:** Select remote sensing images provided by Local Space Viewer, Google Earth and other software, interpret and extract the land form of cultivated land in Dujiang Dam city, and express the schematic language through color and line in the later stage. The road map of schematic language extraction is shown in Figure 1.

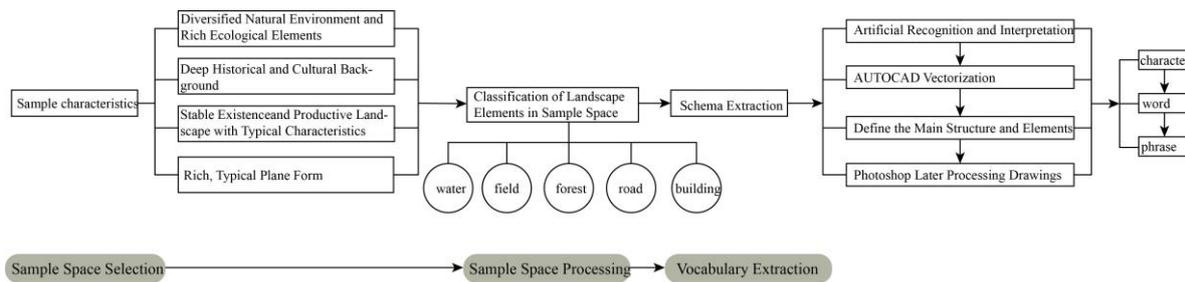


Figure 1. The road map of schematic language extraction

## 2.2. Analysis of Schematic Language of Cultivated Land Form

### 2.2.1. Vocabulary of Schematic Language of Cultivated Land Form in Dujiang Dam

Dujiang Dam has a profound historical and cultural background. With the joint influence of natural and human factors, these characters, words and phrases with distinct characteristics have been formed, which together constitute the basic schematic language vocabulary of the land of Dujiang Dam.

- **Characters:** The basic unit of the land form schematic language of Dujiang Dam is the character, which includes two types of cultivated land: field and fish pond. The fields are divided into L-shape, irregular quadrilateral, arc, rectangle and strip. According to its size and basic shape, the area of rectangular and strip fields is larger than that of other three types of fields, rectangular and strip fields are also more numerous than the other three. Different from the more orderly cultivated land form in the north, the area and form of various "characters" in Dujiang Dam field are quite different, mosaic and combine with each other, forming a rich landscape. Ponds are divided into irregular massive fish ponds, rectangular fish ponds and river-lake fish ponds, and rectangular fish ponds are more affected by human factors than the other two kinds of fish ponds.
- **Words:** The basic unit words combines with each other and forms the words in the cultivated land schematic language, among them, the words in the field type are divided into three types: surrounding type, staggered type and homogeneous type. The word "surrounding type farmland" is mostly composed of the word "arc farmland" and other types of farmland. The word "staggered farmland" is mosaic of the word "irregular quadrilateral farmland" and other types of farmland. The word "homogeneous farmland" is composed of rectangular farmland and strip farmland, while the other types are less. There are two types of words in fish pond type: strip type and block type, among which the words "rectangular" fish pond and "irregular" fish pond account for the majority.
- **Phrases:** The combination of the above words and linpan forms phrases, which can be divided into three types: field-enclosed linpan type, field combination surround type and linpan-enclosed field type. As can be seen from the figure, the field-enclosed linpan type and the linpan-enclosed field type are two relative phrases, the former is small linpan area, in the type of the field-enclosed linpan, there are residential buildings in linpan; the latter is the linpan-enclosed field type, buildings are scattered in linpan. The field combination surround type is the combination form of field mainly, ponds and linpan scattered in the field.

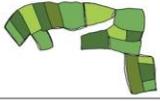
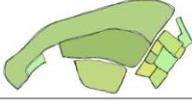
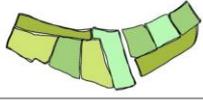
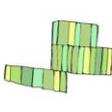
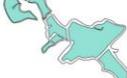
Words	field	surrounding type			
		staggered type			
		homogeneous type			
	fish pond	strip type			
		block type			
Phrases	field-enclosed linpan type field combination surround type linpan-enclosed field	 field-enclosed linpan type	 field combination surround type	 linpan-enclosed field	

Figure 2. Vocabulary of Schematic Language

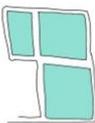
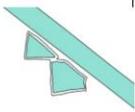
Characters	field	L-shape			
		irregular quadrilateral			
		arc			
		rectangle			
		strip			
	fish pond	irregular massive fish ponds			
		rectangular fish ponds			
		river-lake fish ponds			

Figure 2. Vocabulary of Schematic Language

2.2.2. Evaluation and Analysis of Landscape Ornamental Value of Cultivated Land Form

Agriculture is not only as the object of production, but also as the object of aesthetic appreciation. As a landscape, agriculture is presented before people's eyes and forms a local landscape with unity of productivity and aesthetics. [7] Its inherent culture and historic significance are also important factors attracting people. [8] Aboriginal people's daily life and public activities (behaviors) derived from it, which have a considerable mass basis, are one of the main components of regional cultural characteristics [9]. As a cultural representation, cultivated land landscape is also a concentrated reflection of collective behaviour and values.

By issuing questionnaires and using the method of score evaluation, the ornamental value of

landscape of cultivated land form mainly consisting of kiwifruit economic forest, landscape and linpan of cultivated land form dominated by paddy fields, and mixed linpan consisting of paddy field and kiwifruit economic forest are evaluated respectively.

The results of questionnaire analysis show that people have the highest evaluation on the cultivated land form landscape with paddy fields as the main ornamental value, and the lowest evaluation on the cultivated land form landscape with kiwifruit economic forest as the main ornamental value. The land landscape formed by fields has a high recognition degree. Apart from the differences in the ornamental value of several types of cultivated land landscape, the infiltration of history and culture and people's deep emotion for the traditional cultivated land formed by nature also influence people's evaluation of cultivated land landscape form. The various landscapes of cultivated land form have become spiritual sustenance in the hearts of the people who have left home. [10]

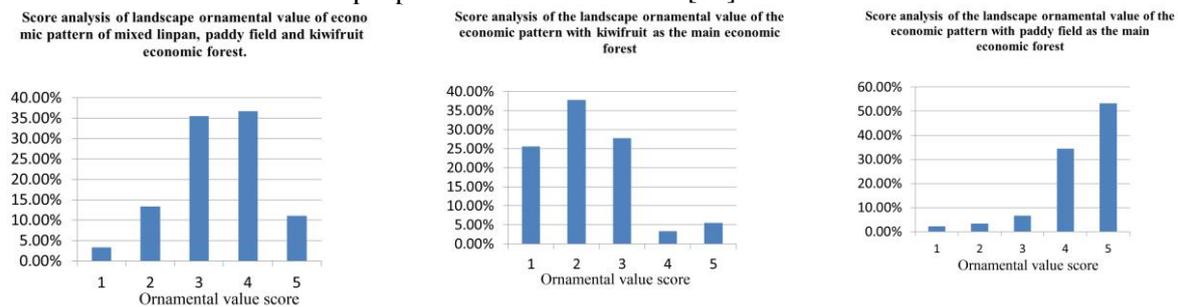


Figure 3. Statistical map of cultivated land form landscape appreciation value

### 3. Analysis of Dynamic Change of Cultivated Land Morphology in Dujiangyan

#### 3.1. Comparison of Historical Changes of Cultivated Land Morphology

The changes of cultivated land morphology in Dujiangyan over the years were compared by satellite images. The observation of changing process of cultivated land 1 is shown in Figure 4. In 2006, the land use mode was mainly paddy land, whose land form was extended to both sides by irrigation ditches. In 2012, compared with 2006, the land pattern was basically unchanged, but the crops cultivated were significantly different on each piece. In 2013 most of the small fields were consolidated into larger plots. But the traditional land texture has not changed greatly. In 2014, it was obvious that the original land form formed by armature irrigation almost disappeared, forming a large and complete kiwi planting area. Only the ditch remained. In 2016, there has seen only minor changes. In 2017, the kiwi planting area was more complete, and there was little left of the original land texture.

The observation of changing process of cultivated land 2 is shown in Figure 5. The cultivated land of this block can be regarded as centrally distributed with residential areas as the origin. It has the characteristics of cultivated land in western Sichuan. A new road built in 2012 divided the previously intact farmland into two pieces. The farmland of the east became woodland. According to the satellite map in 2017, the forest area of the observation site increased and the original texture basically disappeared.

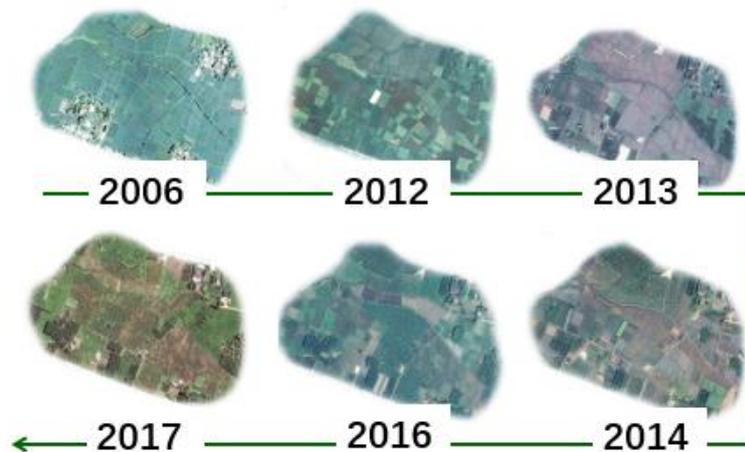


Figure 4. The observation of changing process of cultivated land 1



Figure 5. The observation of changing process of cultivated land 2

### 3.2 Analysis of Driving Factors of Cultivated Land Morphology Change

According to the comparison of the historical changing process of cultivated land form and the semi-structured interview analysis, the artificial driving factor analysis of cultivated land form change was obtained.

- Policy influence: Due to the implementation of the household contract responsibility system, each household was given a small piece of farmland, and the same types of crops were planted in the same area. As a result, the farmland landscape in Dujiangyan formed a texture of farmland divided by irrigation channels, which had a high continuity and integrity.
- Crop impact: In recent years, due to different living needs of farmers and differences in family economic conditions, their land management methods and crop varieties (especially cash crops, such as kiwi fruit and economic forests) are different, making the farmland landscape messy. It breaks the continuity of its whole.
- Ideology: The attitude of townspeople is an important factor affecting the protection of traditional cultural landscape. According to the survey results, in terms of rural landscape protection, residents believe that the traditional regional cultural landscape is lagging behind the times and its protection directly affects the modernization process of towns and villages and the improvement of life quality. Due to the poor life quality of most residents, they hold a negative attitude towards protection and have not formed the consciousness of cultivated land landscape.
- Protection measures: Village committee, village brigade, government-organized large area land circulation, infrastructure construction all have a great impact on the change of cultivated land form. At present, the protection of cultivated land only remains at the level of area data and the impact of various activities on the landscape culture carried by cultivated land is not considered enough, thus breaking the cultural landscape of cultivated land in Dujiangyan armature irrigation area.

### 3.3 Impact Analysis of Cultivated Land Morphology Change

In the past 15 years, the integrity and continuity of cultivated land landscape in Dujiangyan artesian irrigation area have been destroyed and the landscape stability has been declining. Based on the phenomenon of the disappearance of cultivated land texture, along with the disappearance of some unused ditches in artesian irrigation, the traditional cultural landscape is losing seriously, and the loss rate is increasing year by year. With the continuous development of economy, the further promotion of rural construction and the development and construction of other activities, the beautiful idyllic life is leaving us. If relevant measures are not taken in time to strengthen the awareness of protection from all walks of life, cultivated land cultural landscape will become an increasingly vague symbol along with rural memory.

## 4. Conclusion and Discussion

- Dujiangyan is rich in cultivated land forms and diversified in combination. Woodlands, dwellings, cultivated land and ditches constitute the unique landscape of artesian irrigation area in western Sichuan. This paper defines the cultivated land form in Dujiangyan by schema language, divides it into characters, words and phrases according to its characteristics, and probes into its internal connections and differences. On this basis, it analyzes the ornamental value of the land landscape and the investigation shows that the cultivated land type dominated by fields has the highest ornamental value.
- The historical comparison of cultivated land in armature irrigation areas shows that in recent years, almost all cultivated land forms formed by armature irrigation have disappeared, the original land texture has been seriously damaged, and the integrity and continuity of cultivated land landscape have also been damaged and the stability has been reduced. Through investigation and analysis of its driving factors, it can be concluded that government policy, social economy, people's protection consciousness and protection measures and other human factors affect the change of cultivated land form.

This thesis defines the traditional pattern language of cultivated land form in self-flow irrigation area, combs its texture, analyses its trend of changing, causes and effects, in order to solve the contradiction between the protection of landscapes with cultural characteristics and the improvement of residents' life quality and economic development, and provides a certain reference for the study of land form, and at the same time provides a reference for the protection and planning of cultural landscape.

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