Research on the Rural Cultural Landscape in Metropolitan Area of Chengdu, China——a Case in Dujiangyan City

（中国･成都大都市圏における農村地域の文化的景観に関する研究：都江堰市を事例として）

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Examination Committee

Prof. Makoto YOKOHARI
Prof. Mikiko ISHIKAWA
Prof. Yukio NISHIMURA
Prof. Osamu KOIDE
Prof. Yasushi ASAMI
Prof. Toshiya OKURO

Department of Urban Engineering
Graduate School of Engineering
The University of Tokyo, Japan

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Abstract

This study focuses on the rural areas of the Metropolitan Chengdu, China, especially on the Linpan areas in the alluvial plain (fan-shape area) of Dujiangyan City that serves as the irrigation source of the Chengdu Plain. The magnificent rural cultural landscape in this area was formed in traditional agrarian era, while after entering the modernization era, the focused area is facing the crisis of “Three Rural Issues” of poverty, inefficient production and urban-rural development gap, which resulted in the loss of identity of rural cultural landscape. Especially after the Sichuan Earthquake in 2008, the New Village Construction movement based on the new Urban-Rural Planning Law has tremendously influenced and affected the characteristic of traditional rural landscape, and the rapid transition is still in a process.

From the perspective of sustainability of rural landscape, this study aims to develop the methodology of sustainable development planning for rural cultural landscape in the focused area. With careful analytical discussions on the cultural landscape of the Linpan in the focus area, the value, characteristics and transition can thus be recognized and further serve as the concrete foundation for this study to propose explicit methodology for conservation and revitalization of the regional-scaled rural landscape of the fan-shape area and also the community-scaled Linpan reconstruction, plans for new village development, legal regulations, design and so forth. The academic results of this study are as follows.

First, cultural landscape theories have been introduced to the Linpan areas of Dujiangyan City to further define and explicate the cultural landscape at regional and community scale.

The Rural Cultural landscape on alluvial plain in Dujiangyan city could be defined as “Agroforestry system and its surrounding agricultural landscape based on the World Heritage Dujiangyan irrigation waterway system. This traditional system has the flexibility in adaption to dynamic changes of modernization, while having active social role. The combination of Linpans produces evolutionary infrastructure in regional sustainability, such as ecological, recreational, economical aspects, and the evolution has been still in progress”.

From the regional-scaled point of view, the rural cultural landscape in this area is based on the delicate irrigation canals formed by the Dujiangyan Irrigation System that has 2300-year-old historic legacy. The scattered villages established along

watercourses and the farmlands surrounding these villages are the smallest unit in the practice of sustainable land use system in this specific area. If comparing the interrelation of individual objects in the land use system to the organic cell structure, watercourses would be capillaries, Linpans would be cell nucleus and farmlands would be cytoplasm. Watercourses in this area have distinctive hierarchic structure that consists of 4 levels which share various spatial relations with the Linpan.

From the community scaled point of view, the rural cultural landscape of the Linpan consists of family units and the agroforestry system that utilize diversities of the multilayer vegetation in monsoon climate. The Linpan serves not only as the living space, but also the agricultural and forestry production space for the villagers to lead self-sufficient lives. More than 90% of traditional Linpans are around 1ha at size, and this scale indicates the small-scaled aggregated living style.

Second, this study discusses in detail on the transition of rural cultural landscape and lifestyles in the Linpan area of Dujiangyan City according to three respective eras.

Traditional Agrarian Era (before 1978) is the reference era for the traditional rural cultural landscape characteristics. The landscape structure at regional and community scale was the result of long-term interaction between the self-sufficient lifestyle of the villagers and the natural elements. The lifestyles of the villagers had deep connection with the vegetation in the Linpan. Especially, since the demand of woods as building materials and as firewood, the maintenance and management of forests within the Linpan and along the watercourse was important and well organized.

As the time came to Early-Modernization Era (1978-2008), with the modernization of construction techniques, concrete and bricks were widely used, hence the decrease of the demand for large arbors from the Linpan. Tall arbors in the Linpan were replaced with fruit trees or other seedlings that were of higher economic benefit. Also, with the significant economy difference between urban and rural areas, the outflow of population leads to increase the hollowed Linpan, and the tourism-oriented Linpan also appeared for the thriving rural tourism. However, the rural cultural landscape structure of the Linpan areas was still maintained.

Since Mid-Modernization Era (after 2008), as the post-earthquake reconstruction affairs started, primary principles for operating the new villages constructions involve the concentrated living spaces of the villagers and the transforming residential lands

to farmlands. In the new villages, though with well-organized infrastructure, as the density of buildings got higher, the planting space for trees became insufficient, hence unable to maintain the original agroforestry system. In the focused area of this study, three types of new villages were classified based on the analysis on the construction methods of the 52 new villages established.

Third, the methodology of sustainable development planning for the rural cultural landscape areas were proposed in both regional and community scale.

At the regional scale, two respective greenbelts were specified in the fan-shape area. Greenbelt 1 is designated as the preservation core zone of the Linpan cultural landscape. This study advises strongly against the development of new villages in this area for the better preservation of the traditional landscape structures and the essential landscape elements. Greenbelt 2 is designated as the buffer zone of Greenbelt 1, and the development of new villages with proper intensity would be acceptable. In addition to the zoning policy, based on the precise studies about traditional and re-organized waterway networks, 12 types of rural community clusters have been identified, and the rural cultural landscape cluster map has been made. Furthermore, the different regulations that should be applied to each cluster type in order to achieve the target of conservation and revitalization of rural cultural landscape in regional scale have been proposed. By combining the zoning policy and cluster management policy, the methodology of the sustainable development planning for rural cultural landscape has been proposed.

At the community scale, three methods are proposed for the reformation of Linpan and the construction of new villages. Adequate changes of the construction style, vegetation species, family units and the Linpan structure in traditional Linpans or new villages are recognized, but the agroforestry system as the bottom line for the traditional Linpan characteristics should try to be maintained in any case.

The academic contribution of this study is that this is the first research in China, concerning the characteristics and transition of the Linpan areas in Dujiangyan City, especially focusing the New Village Construction Movement after the 2008 earthquake in Dujiangyan City. This study demonstrated academic originality concerning the explication of the Linpan area in Dujiangyan City with cultural landscape theories, the analysis of cultural landscape at the regional and community scale, and the proposal of macro and micro scaled methodology for sustainable

development planning. The methodology which has been clarified in this study, could be efficiently applied to other rural areas in alluvial flats of China.

Keywords： Rural Cultural landscape, Agroforestry, Linpan, Irrigation Watercourse system, Chengdu, Dujiangyan,

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Chapter 1

Introduction

Chapter 1. Introduction

1.1 Research Background

The Metropolitan Chengdu is located in the Chengdu Plain[1] where is referred to as the Land of Abundance[2] by the famous strategist Zhuge Kongming[3] due to the fertile lands that had very few case of floods. This ideal environment for agriculture took great benefit from the Dujiangyan Irrigation System (Cao, Liu et al, 2010) [1] built by LI Bing[4] and his son that accomplished both the irrigation of the plain and the adjustment of the flood and drought. The artificial streams divided by the Dujiangyan cover the whole Chengdu Plain like intertwined networks and form a broad agriculture landscape. While the residents on the plain lead their lives with the water and form natural communities that are connected by waters.

Cultural landscapes are the "combined works of nature and of man" (UNESCO 2012) [2]. From the theoretic aspect of cultural landscape, for more than 2000 years the rural cultural landscape of Chengdu Plain has been a magnificent work of combined works of human and the nature that utilized artificial modifications to the natural elements (the terrain and the rivers) for the agricultural production needs of the local residents.

Nevertheless, with insufficient knowledge of the concept and also incomprehensive discussions on the methodologies, most people in China have indifferent attitude toward the definition, the value and the conservation of cultural landscape. This phenomenon is especially disquieting in rural areas where there are limited economic developments. It is found that inappropriate exploitations for economic benefits in these specific areas are leading to the disappearance of rural cultural landscapes (XDT 2011) [3].

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[1] Chengdu Plain (成都平原) is an alluvial plain located in the western part of Sichuan Basin in Sichuan, China.

[2] Land of Abundance (天府之国) nowadays is commonly known as Chengdu City, Chengdu Plain, Sichuan Basin or Sichuan Province and is also used widely to praise Chengdu and Sichuan.

[3] Zhuge Liang (諸葛　亮) (181–234), style name Kongming（孔明）, was a chancellor of the state of Shu Han (蜀漢) during the Three Kingdoms period. He is often recognised as the greatest and most accomplished strategist of his era.

[4] Li Bing (李 冰) (3rd century BCE), was a Chinese administrator and engineer of the Warring States period. He served the state of Qin as an administrator, and has become renowned for his association with the Dujiangyan Irrigation System.

The Metropolitan Chengdu, in specific, has been nibbling away of its agriculture areas and the countryside landscape along the urban areas is thus disappearing due to the industrialization and the expansion of the cities.

From the aspect of national policies, starting from 2007, Chengdu became primary city for the Urban and Rural Development project (Cui 2012) [4]. This project was designed to tackle the imbalance in the economic development between urban and rural areas, especially concerning the agriculture, villages and farmers. With this project in progress, the development of the industry, economy, society and culture of countryside areas received attentions greater than ever (Hu, Xue et al. 2009) [5].

In the January of 2008, as the Urban and Rural Planning Law[1] of China replaced the original Urban Planning Law[2], the planning of rural areas are thus included in the development project (Zhao 2008) [6]. After the 2008 Sichuan Earthquake, a large scale of "New Village Construction" movement in the earthquake-stricken northwest area of Chengdu City was initiated according to the Urban and Rural Planning Law (Hua 2010) [7].

Further in 2009, as the "Garden City" (Howard 1898) [8] theory of Ebenezer Howard[3] was introduced into Chengdu City, the first city that aims to achieve the "world garden city" in China was thus proposed (Xian 2011) [9]. Based on this goal, a comprehensive plan (CMG 2011) [10] for the urban system of Chengdu was proposed and it further considers the massive rural areas surrounding the urban area as greenbelt and joins the development of urban and rural areas together as a "marriage of urban and rural areas" (Ishikawa 2010) [11].

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[1] Urban and Rural Planning Law（城鄉規劃法）is legislated for the purpose of strengthening the management of urban and rural planning, the coordination of spatial arrangement of both areas, the improvement of living environment and the encouragement of socioeconomic condition of the urban and rural areas on their sustainability. This law is adopted by the 30th session of the Standing Committee of the tenth National People's Congress on October 28, 2007 and enacted since Janurary 1, 2008 with seven chapters and seventy articles.

[2] Urban Planning Law（城市規劃法）is adopted by the 11th session of the Standing Committee of the seventh National People's Congress on December 26, 1989 and enacted since April 1, 1990. The Urban Planning Law is the first law focusing on the urban planning, urban construction and management enacted in China and is also a basic law for the overall urban construction and development.

[3] Ebenezer Howard (1850–1928) is known for his publication *Garden Cities of To-morrow* (1898), the description of a utopian city in which people live harmoniously together with nature. The publication resulted in the founding of the garden city movement, that realised several Garden Cities in Great Britain at the beginning of the 20th century.

Due to its geological structure[1], the Dujiangyan City in Metropolitan Chengdu is among those major earthquake-stricken areas of the Sichuan Earthquake in May 12, 2008 (He, Chen et al. 2011)[12]. The Dujiangyan Municipal People's Government established expert groups for post-earthquake reconstruction four days after the Earthquake stroke Sichuan and in June 10 of the same year, the DMPG invited urban planning institutions worldwide for the joint research and study on the establishment of post-earthquake construction plans (Chen 2012) [13]. Finally, there were 10 research groups formed from those research institutions that participated in the field investigation and the establishment of post-earthquake reconstruction plans. 10 feasibility plans were proposed by these groups (CPMB 2008) [14].

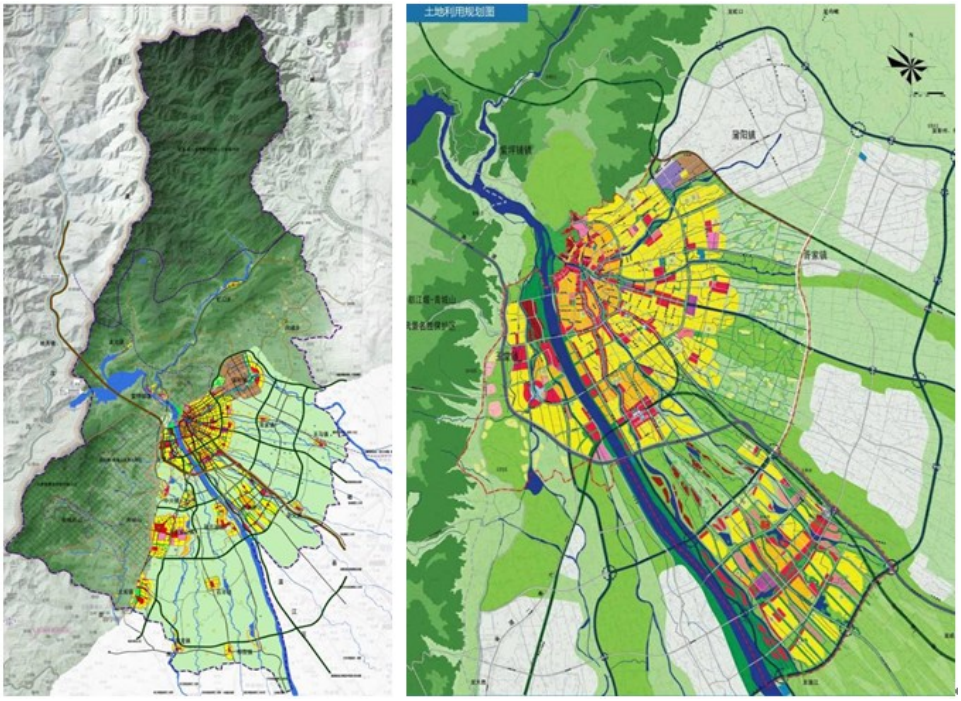


Figure 1-1 Post-Earthquake Regeneration Plan of Dujiangyan (2008-2028)[2]

Based on the aforesaid plans, the government announced a final version of reconstruction plan known as the Post-earthquake Regeneration Planning of Dujiangyan (TJUPDI 2008) [15] (Figure 1-1)，Compared to the previous version of the overall planning in 2007 (RSP 2007) [16] the new version focuses more on the control of the expansion of cities and reserves more rural areas for the greenbelts that serve to protect the landscape and brings in the concept of developing rural tourism.

[1] Dujiangyan City is located on the fault zone between Tibetan Plateau and Sichuan Basin.
[2] Figure source: Chengdu Planning and Management Bureau

Figure 1-2 Image of Linpan (Rural Community)

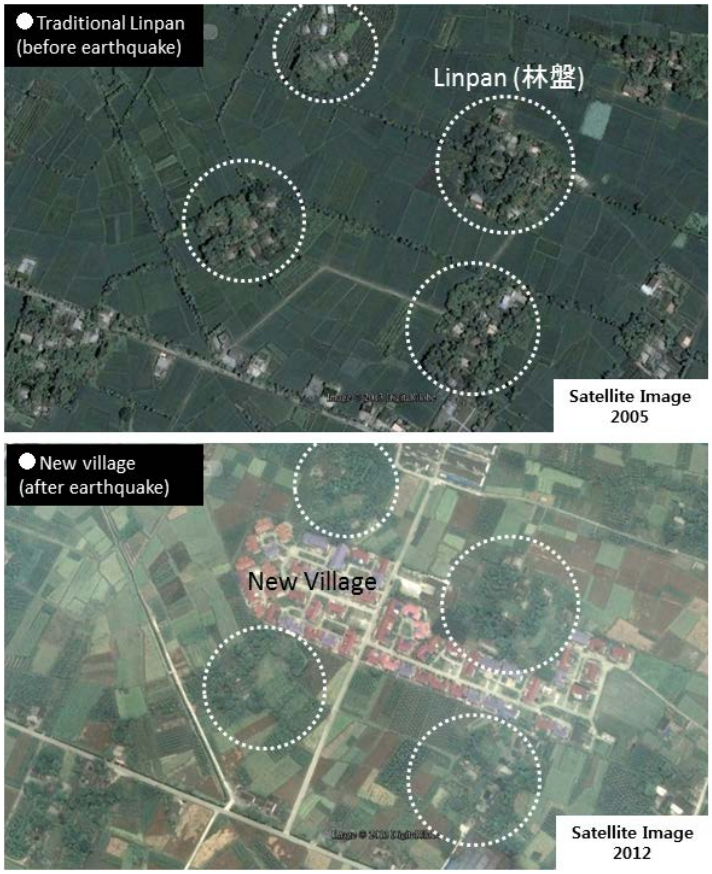


Figure 1-3 Landscape Change Brought by New Village Construction Project[1]

The New Village Construction works that based on the plans and the Urban-Rural Planning Law[2] were accomplished in 2009. Though the government proposed

[1] Satellite image source: Google Earth. Figure constructed by author.

[2] The New Village Construction Movement in Dujiangyan City was the first case that served as significant demonstration for the following relative works of country after the new version of Urban-Rural Planning Law was proposed.

technical guidelines on construction of New Village (CPMB 2009) [17], with the difference of the construction methods, funding and developers, unfortunately, many cases of damage in the original Linpan landscape at different scale are found in new villages (Figure 1-2). As in Figure 1-3, a large new village was built between farmlands in Linpan. The villagers in Linpan were moved to the new village and those household foundations left in the Linpan were used as farmlands. This alteration of land use caused damages to the original landscape structure.

1.2 Research Significance

The significance of this study lies not only in its close attention paid to the cultural landscapes (Mount Qingcheng and the Dujiangyan Irrigation System) that are worthy to be included in World Heritages, but also in its detailed discussion on how the conventional rural landscape created by the Dujiangyan Irrigation system should be included also in the cultural landscape heritages. Additionally, with a consideration of the fast economic growth of China, the process of how she recognizes the characteristics and the value of rural cultural landscapes and how she conceives the approaches for preservation and utilization to fulfill the goal of sustainability and future development of rural cultural landscapes will also be included in the discussion. This discussion on methodology for cultural landscape conservation and utilization can further serve as models for the current New Village Construction Movement.

1.3 Research Questions

The following questions are the primary focuses and the structure of this study.

- How to define the rural cultural landscape on plain area of Dujiangyan city as well as metropolitan Chengdu?
- How did the living culture of farmers form the particular rural landscape in plain area? What is the relationship between cultural change and landscape change in this area?
- How to conserve rural cultural landscape and what kind of sustainable development methods should be adopted in this area?

1.4 Research Objectives

The purpose of this study is to establish the methodology of sustainable development planning of rural cultural landscape in the focused area, the following three axes have been introduced to achieve this purpose.

1. To elucidate and indicate the definitions, the classifications and the characteristics of landscape structure of the cultural landscapes from the city of Dujiangyan to rural areas of Chengdu City.
2. To explain in detail concerning the impact of modernization and the new rural improvement affairs for earthquake revival on the traditional cultural landscape of rural areas of Chengdu City conurbation.
3. To examine methodology for achieving the revival of rural areas and the sustainable development of traditional cultural landscape in harmony with the case of Dujiangyan City as an example.

1.5 Research Methodology

Research methodology is a systematic way to solve a problem. It is a science of studying how research is to be carried out. Essentially, the procedures by which researchers go about their work of describing, explaining and predicting phenomena are called research methodology. It is also defined as the study of methods by which knowledge is gained. Its aim is to give the work plan of research. Why a research has been undertaken, how the research problem has been defined, in what way and why the hypothesis has been formulated, what data have been collected and what particular method has been adopted, why particular technique of analyzing data has been used and a host of similar other questions are usually answered when talking of research methodology concerning a research problem or study (Kothari 1985) [18].

1.5.1 Definition of Culture in this Research

Culture is a modern concept based on a term first used in classical antiquity by the Roman orator Cicero: "cultura animi" (cultivation of the soul). This non-agricultural use of the term "culture" re-appeared in modern Europe in the 17th century referring

to the betterment or refinement of individuals, especially through education. During the 18th and 19th century it came to refer more frequently to the common reference points of whole peoples, and discussion of the term was often connected to national aspirations or ideals. Some scientists used the term "culture" to refer to a universal human capacity [19].

In the 20th century, "culture" emerged as a central concept in anthropology, Hoebel describes culture as an integrated system of learned behavior patterns which are characteristic of the members of a society and which are not a result of biological inheritance (Hoebel 1966) [20].

Aspects of human expression include both material culture and ephemeral elements. These include: language and dialect, religion, technology, cuisine, aesthetics - art, music, literature, fashion, and architecture, values, ideology, gender roles, commercial practices, social conventions, recreational activities, social structure [21].

1.5.2 Research Hypothesis

Hypotheses play a specific but limited role in social research. They are only relevant when 'why' questions are being investigated, and, then, mainly when the Deductive research strategy is being used to answer them (Blaikie 2009) [22].

Two basic hypothesis of this study are as the following:

1. The people living on the Chengdu Plain modified the nature as they adapted to the environment and formed a unique style of production and living. This intangible style of production and living is the intrinsic motivation for the formation of tangible rural landscape. Also, the change of this production and living style is the rationale to the change of rural cultural landscape.

2. Rural Cultural Landscape conservation could be both considered in regional scale and community scale. There exists invisible self-sufficient system beneath the visible rural cultural landscape.

3. The Urban and Rural Planning Law, which is at a level of national policy on regional affairs, and the new rural construction movement after the earthquake as well as the planning concept of world garden city together make great influence on the sustainability of rural cultural landscape via changing the lifestyles of

people in rural areas and revitalizing the economy of rural areas simultaneously.

1.5.3 Research Methods

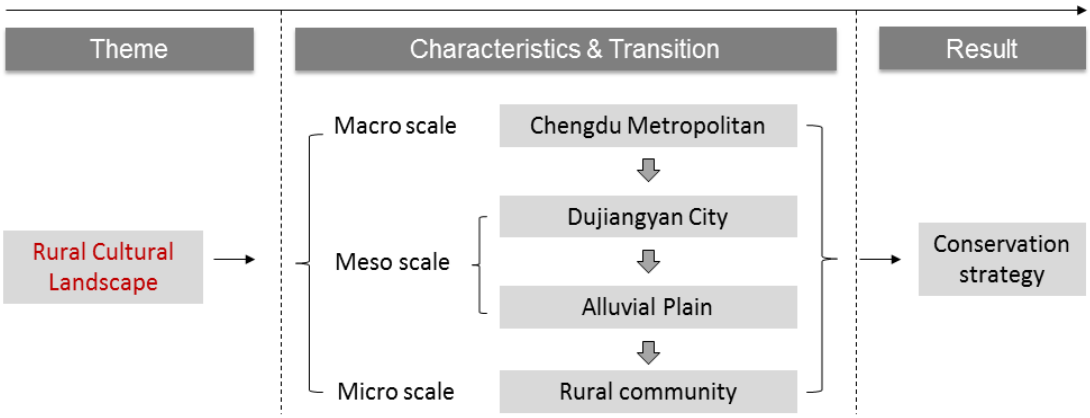


Figure 1-4 Research Methods

1. With careful literary review, the practice and theories of cultural landscape in China will be discussed in general, which will lead to further summary on what has been achieved and what problems are encountered.

2. Via hearing investigation lead by the Chengdu Planning and Management Bureau, the speech will be taken into consideration in this study as well as the displayed data of this bureau. Based on the aforesaid materials, at a regional scale, this study will thus analyze the significance of metropolitan areas of Chengdu City in Sichuan Province and even in China concerning the agriculture and rural areas development. This analysis will also take into consideration the regional plans and will also examine relative policies from a rural cultural landscape aspect. Further, with the application of GIS, Google Earth and relative software, the current structure of metropolitan areas of Chengdu City will be mapped out and used for the analysis on the composition of its cultural landscape status quo.

3. Taking an example from the city of Dujiangyan, the satellite city of Chengdu City, this study will analyze the rural cultural landscape characteristics and how modernization brings changes. At a scale of city and with the utilization of GIS and Google Earth, this study will produce topographic map of Dujiangyan City and also theme maps such as urban system structure and land use. Based on these data and maps, basic statistics on the distribution of forest, water, villages and farmlands in mountain and plain areas will be measured and analyzed

respectively for the determination of classification and characteristics of traditional rural cultural landscape of that specific region. Also, at a scale of a village, field surveys on tangible landscape and hearing investigations on transition will be conducted to compare with the intangible production and lifestyles changes of local people, which are also collected via hearing investigation and survey[1] (Figure 1-5).

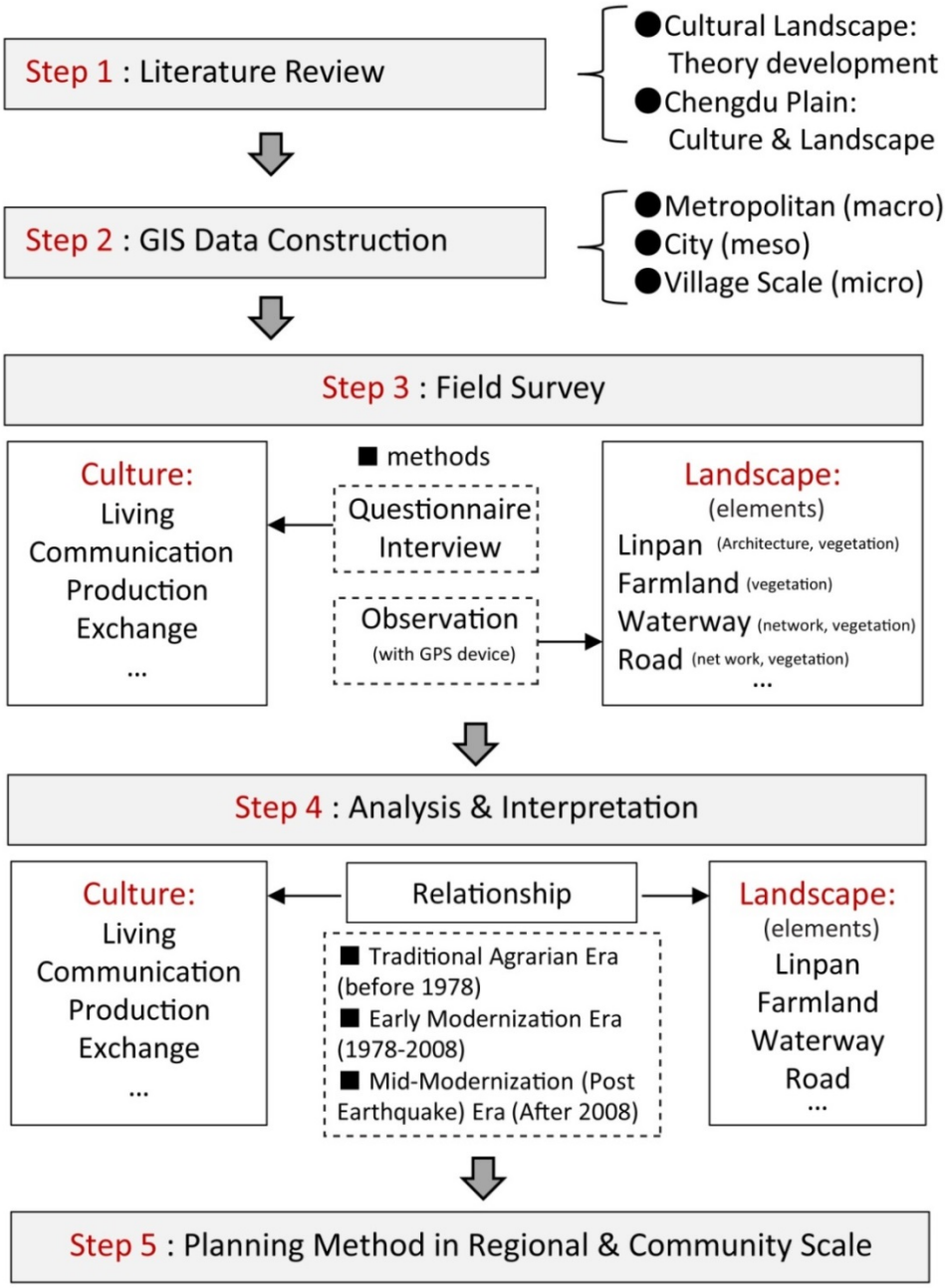


Figure 1-5 Research Flow

[1] The survey time are March and July of 2011 (on the life facts in Linpan), March of 2012 (on the vegetation), and September and October of 2012 (on the reconstruction of new villages after the Earthquake).

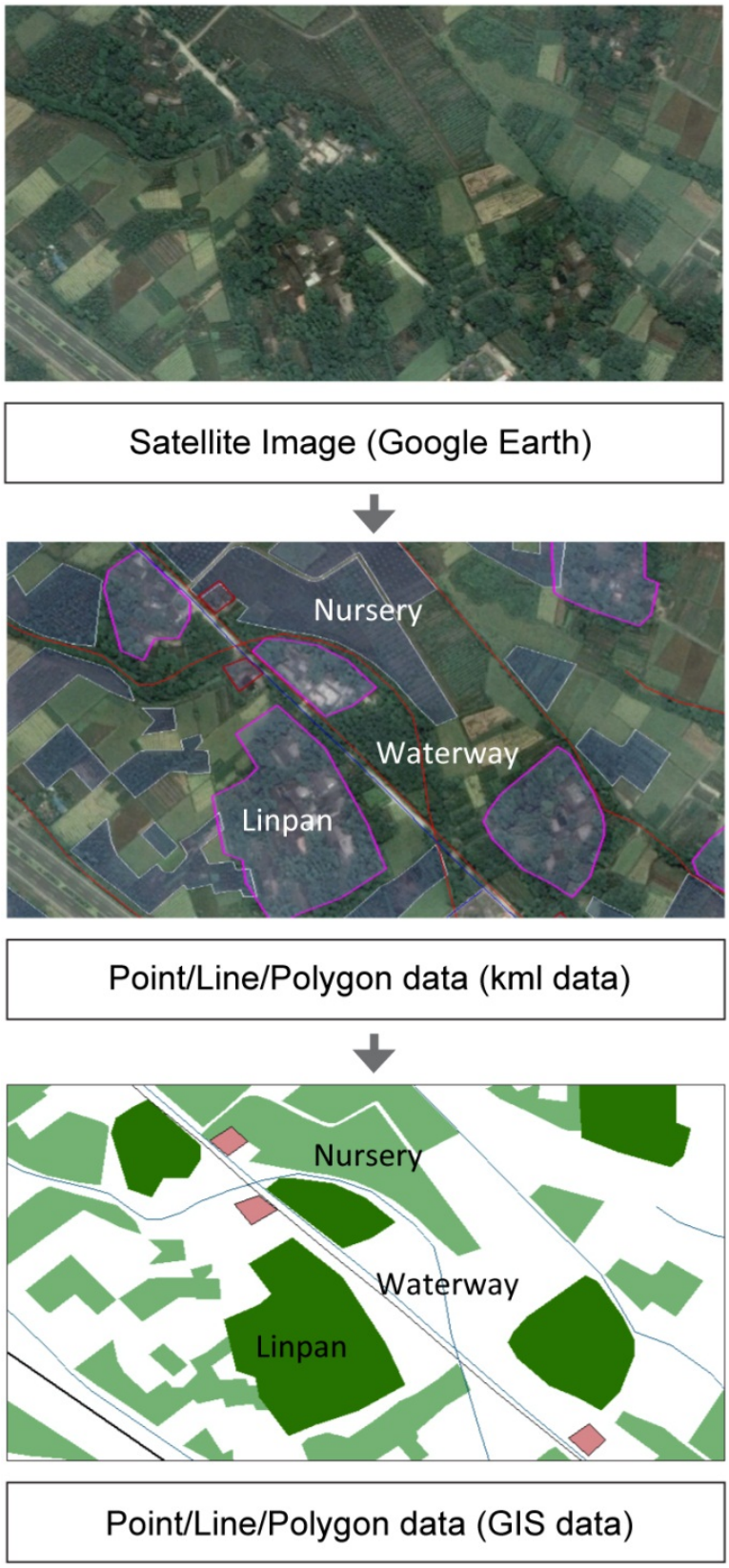


Figure 1-6 Methods of Generating Land Use Data in GIS[1]

[1] Satellite image source: Google Earth. Figure constructed by author.

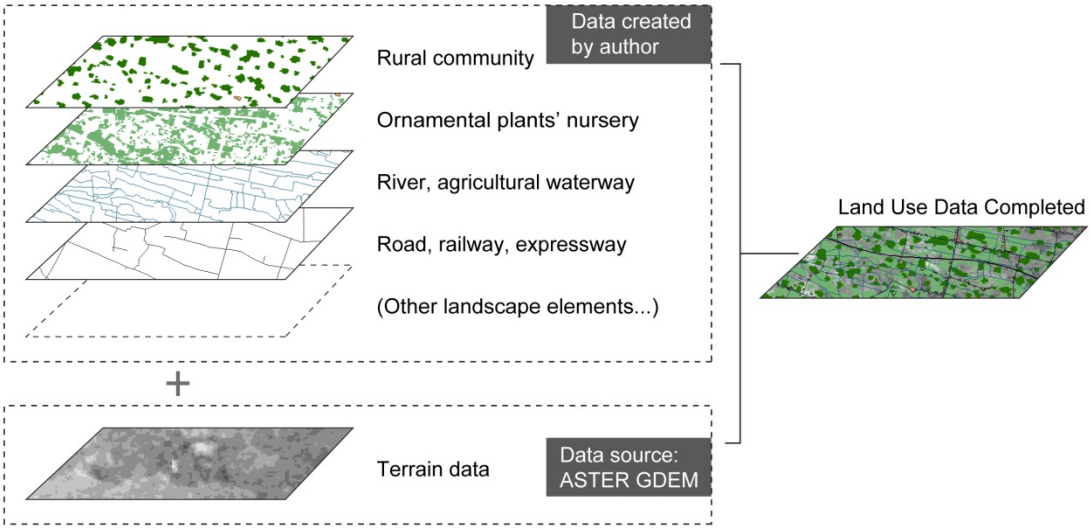


Figure 1-7 GIS data Construction Methods[1]

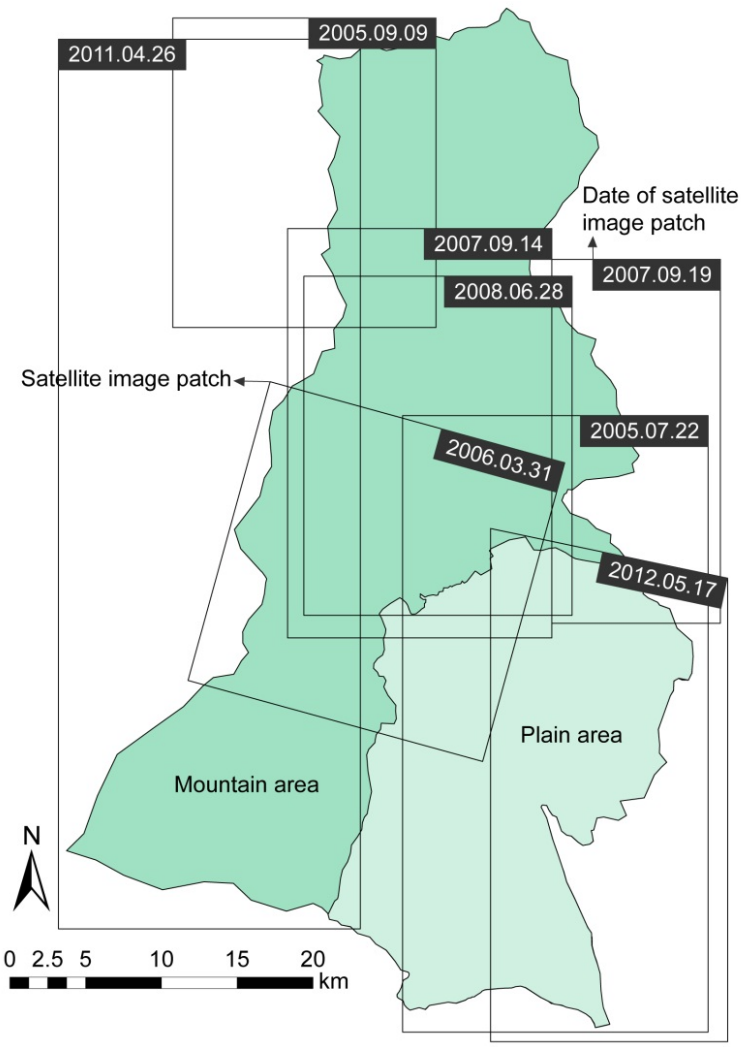


Figure 1-8 Available Satellite Images of Dujiangyan city[2]

[1] DEM data source: ASTER GDEM. Figure constructed by author.
[2] Satellite image source: Google Earth. Figure constructed by author.

4. This study will take the case of Dujiangyan City as an example to elucidate the influence of earthquake revival new rural construction plans on the cultural landscape of rural areas and the tangible and intangible lifestyles of the villagers. To be more specific, tangible landscapes such as land use, settlement scale of new villages, plane configuration of architectures, architectural styles, residence colors, building height, area measure, road system, watercourse, infrastructures, vegetation in the village and crop varieties will be documented based on field surveys that involve GPS-based accurate route recorded in our data. Whereas in the case of intangible lifestyle patterns of the villagers, based on hearing sessions and survey on the local villagers, their lifestyle patterns before and after the earthquake and their satisfaction degree toward life will be included in our data also.

5. Finally, based on the aforesaid analysis and discussion, further discussion on the way to practice sustainability development of rural cultural landscape in Chengdu City and the management approaches will be discussed with the case of Dujiangyan City as an example.

1.6 Thesis Structure

This research could be divided into 7 chapters (Figure 1-9). In Chapter 1, the research background, significance, hypothesis, objective, methodology, main research questions and research flow will be clearly stated. In Chapter 2, and the development of theory and practice of cultural landscape in heritage conservation, with international and domestic experience will be reviewed. In Chapter 3 and Chapter 4, the characteristic and status quo of rural cultural landscape in metropolitan area of Chengdu will be discussed, moreover, taking Dujiangyan city as an example, the rural cultural landscape change in three eras will be clarified. In Chapter 5, Chapter 6 and Chapter 7, firstly the relationship between culture and landscape on alluvial plain of Dujiangyan city will be interpreted, secondly the conservation and sustainable development methodology of rural cultural landscape on alluvial plain in Dujiangyan city will be discussed, and finally all the findings and implications in this research will be concluded.

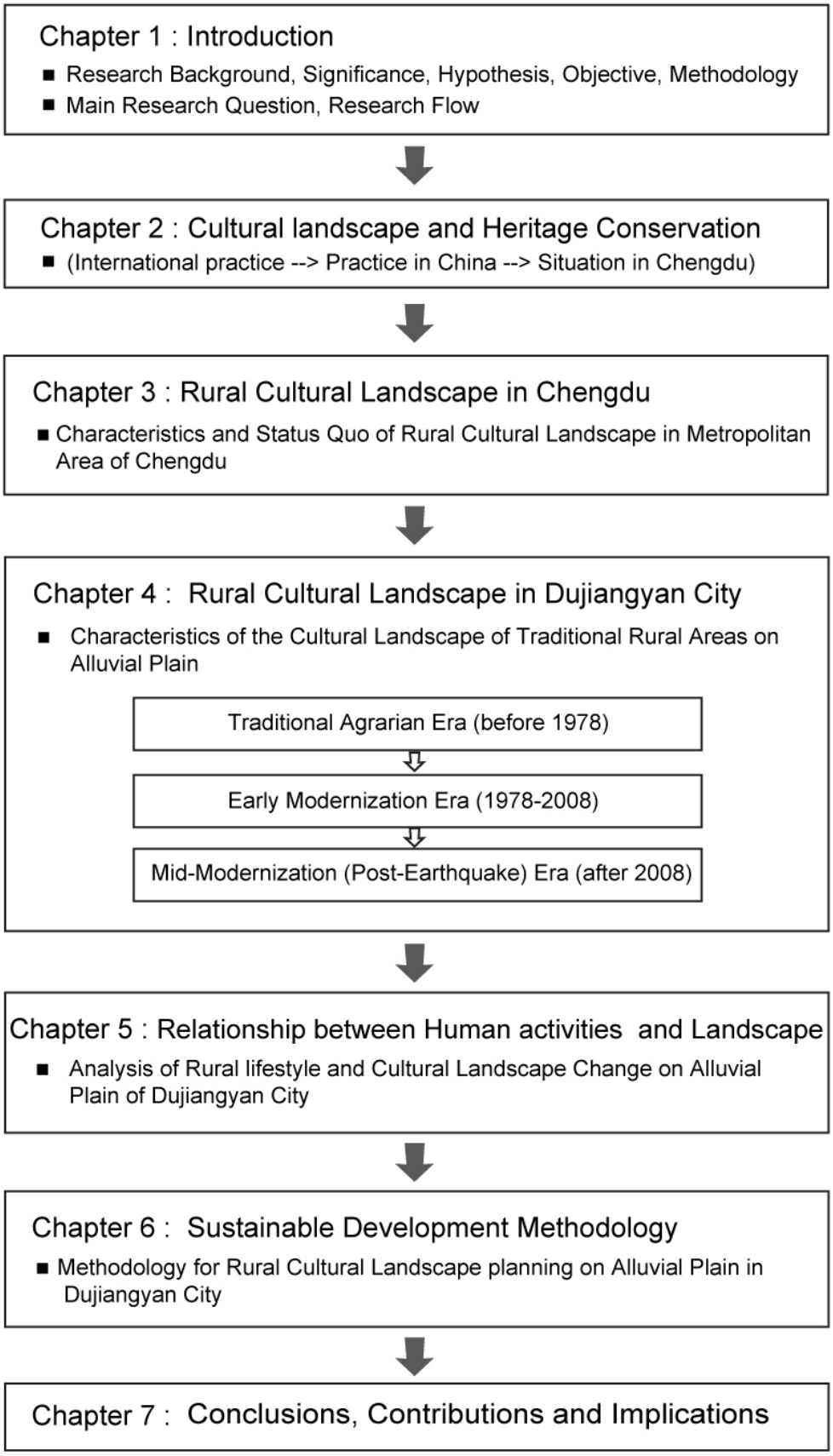


Figure 1-9 Thesis Structure

Chapter 2

Cultural Landscape and Heritage Conservation

Chapter 2. Cultural Landscape and Heritage Conservation

There exist a great variety of Landscapes that are representative of the different regions of the world. Combined works of nature and humankind, they express a long and intimate relationship between peoples and their natural environment (WHC and UNESCO 2012) [23].

2.1 Theory of Cultural Landscape

The word "landscape" is originated from Old English "landskip" which is akin to German "landskaap" that is replaced with ancient German "landschaft" (Roe 2007) [24]. The concept for *cultural landscape* was also firstly discussed in Germany. In late 19th century, German geographer O. Schuluter classified landscapes in two varieties including the original landscape that existed before human activities cause major changes and the cultural landscape that appears after original landscape gets influenced by the human activities.

2.1.1 Definition by Berkeley School of Cultural Geography

Carl Ortwin Saucer, an American geographer, is no doubt the most influential scholar concerning the field of cultural landscape in 20th century. Generally speaking, cultural geography in the western world starts from the Berkeley School that was founded by Saucer, who combined anthropological and sociological aspects into the study of human geography. Saucer's combined concept on landscape studies enabled this field of study, which was originally focused on aesthetic and natural landscape, to finally attempt to discover the human's influence and function to the nature—a cultural function that discusses different results of influences on landscapes from different cultures and societies.

The term *cultural landscape* was introduced in his work, "The Morphology of Landscape" (Sauer, C. 1925) [25]. This work was in part motivated by his dissatisfaction with the environmental determinism, then popular among colleagues. While Sauer agreed with many of them that geography's central questions revolved around the relationship between human beings and their environments, he thought people had as great an effort on the physical environment as it had upon them. In

“Morphology” Sauer argued that the study of landscape should be geography’s primary concern, since the concept mobilized a “peculiarly geographic association of facts.” He defined landscape as “an area made up of a distinct association of forms, both physical and cultural,” while the cultural landscape was something “fashioned from a natural landscape by a culture group. Culture is the agent, the natural area is the medium, the cultural landscape the result” (Riesenweber, J. 2008) [26].

In Sauer’s formulation, landscapes, whether physical or cultural, were material things. They were real and knowable through the visual sense. “Geography is a science of observation”, he wrote in 1956, “The geographic bent rests on seeing and thinking about what is in the landscape…In some manner, the field of geography is always a reading of the face of the earth.”

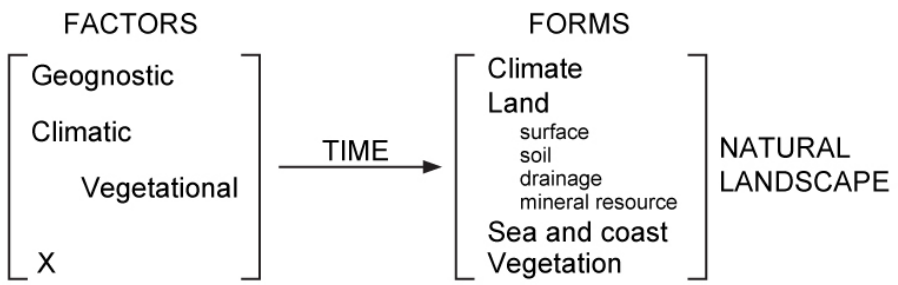


Figure 2-1 Diagrammatic Representation of the Morphology of the Natural Landscape[1]

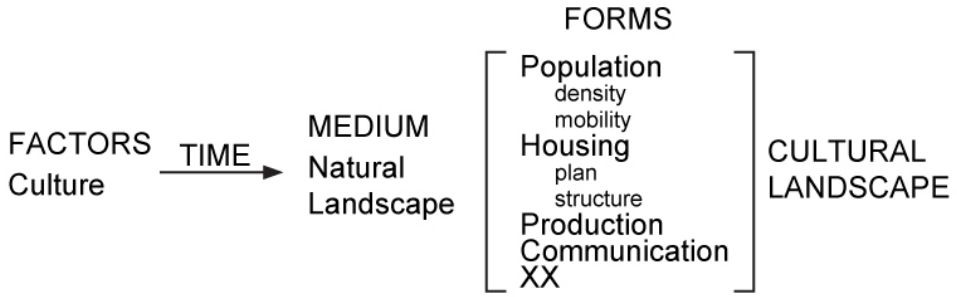


Figure 2-2 Diagrammatic Representation of the Morphology of the Cultural Landscape[2]

“Morphology” outlined a method for that reading, which adapted techniques for tracing geomorphologic and topographic change to the investigation of cultural

[1] Figure Source: Sauer, C. O. (1925) The Morphology of Landscape. Page: 19-54
[2] Figure Source: ibid

landscapes. Whether employed by physical or cultural geographers, the morphological method relied on the observation of landscape forms. For cultural landscape, observable landscape forms included features such as population, housing, and transportation networks. Sauer's goal in observing, mapping, and analyzing such cultural landscape features was tracing landscape change and deciphering the successive layers of residue left on land by human occupation.

This historical approach dominated cultural geography in America through the first half of the twentieth century (Wilson and Groth 2003) [27]. Other members of the "Berkeley School" of cultural geography, so named for the institution at which Sauer was based for most of his career, provided similar conceptual, methodological, and substantive orientation to landscape scholars and preservationists from many universities and backgrounds. One of the more influential of these is Peirce Lewis, who argued that "all human landscape has cultural meaning," and that this meaning might be understood by reading the landscape as if it were a book. "The human landscape is our unwitting autobiography," Lewis wrote, "reflecting our tastes, our values, our aspirations, and even our fears in tangible, visible form" (Lewis 1979) [28].

2.1.2 Interpretation in New Cultural Geography

But not long after preservationists started their massive survey efforts nationwide in the 1970's, cultural geographers began to challenge their own assumptions.

In 1980, James Duncan published a critique of geography's "superorganic" notion of culture, arguing that it gave culture an existence above and beyond the people who transmitted it. This concept portrayed culture as internally homogeneous, downplayed individual agency and choice, and thus overlooked means by which culture operates (Duncan 1980) [29]. Duncan's critique had important implications for landscape geography because if *culture* was a problematic term, then so was *cultural landscape*.

Initially, cultural geography's reformulations of the landscape concept involved questioning its status as a material thing. Drawing from both art historical investigations of landscape painting and Marxist theory, the historical geographer Denis Cosgrove proposed that landscape is as much an idea as a tract of land, and connected its emergence as an idea to capitalistic economic and social formations.

Landscape, he maintained, is “a way of seeing—a way in which some Europeans have represented to themselves and to others the world about them and their relationships with it, and through which they have commented on social relations.” In other words, landscape is an epistemology, “an historically specific way of experiencing the world developed by and meaningful to certain social groups.”

Whereas Sauer conceived landscape as an array of visible, material forms—especially socially constructed forms—Cosgrove considered landscape “not merely the world we see…[but] a construction, a composition of that world” that represents the world in much the same way as a landscape painting (Cosgrove 1998) [30]. While Cosgrove’s analysis does recognize social aspects of landscape, his analysis further differed from Sauer’s in emphasizing individual actions over social ones in the making and remarking of landscapes, something Sauer and his followers had largely ignored.

During the development of cultural landscape theories, it is established firmly that landscape is a dynamic concept that involves cultural and social elements at all times. Studies on the culture of landscapes thus begin from geography, anthropology and history and expand their focus to politics and sociology for probing into the values that landscapes represent and the significance of relative symbols. The interpretation of the value of cultural landscapes therefore includes aspects of heritages, daily lives, societies, politics and economies. With the analysis on location, interpretation of the significance of symbols and scrutiny of literatures, the values of cultural landscapes are thus interpreted with careful considerations (Han and Xu 2012) [31].

2.2 Cultural Landscape in World Heritage Conservation

Cultural landscape as a concept originated from cultural geographic field will not have gained the attention from the world without the contention for the nomination of the World Heritages.

2.2.1 Category of Cultural Landscape

With the cultural landscape concept being widely accepted in the field of world heritages, influences and debates are found in the international landscape architecture field and international heritage preservation. In 1972, as UNESCO formally adopted the Convention Concerning the Preservation of the World Cultural and Natural Heritages in the 17th session, principles that encourage the preservation and

preservation of human cultural and natural heritages and to pass down the Outstanding Universal Value to the following generations were thus confirmed. With the adoption of this convention, the world heritage preservation awareness, international cooperation and assistance in such field, and the preservation of heritages that are of outstanding universal value are improved and thus made this line of preservation and preservation concepts one of the international consensuses.

Nevertheless, it is also noticed that the world heritages in this Convention are products dominated by the western culture and are carried with traditional western philosophical thoughts—the antithesis of man and nature. The Convention draws a clear line between cultural and natural heritages and thus forms a distinctive opposition between nature and culture. The cultural heritages in the Convention are quite limited to the single or group architectures or buildings and the natural heritages are mostly about the biodiversity or aesthetic value of the nature itself. It is therefore found that the separation of culture and nature in the Convention fully represents the limitation of time and culture. In the time when this Convention was adopted, people thought since this Convention covered two major themes of nature and culture, any human heritage should have been able to find corresponding classification. However, in the following discoveries on heritages, the nature will naturally interact with the culture and thus creates a mixture in the concept for heritages. But the concept of mixed heritages is not at all a satisfaction for in this mixed heritage, the nature and culture are still separated and not as an organic whole.

Although the Convention was intended for treating the value of nature and culture equally, in the authentic practice of listing one heritage as world heritage, because too many heritages have their cultural and natural characteristics intertwined, it is usually found that a separation of human and natural elements should be separated or no corresponding classification can be found in the list for world heritage nomination. Cases such as the terraced fields in Asia, the tablelands in Mediterranean area and the grape manors in Europe are all representative cases of manmade landscapes that cannot be listed into world heritages. This phenomenon made the World Heritage Committee to reconsider adding a classification for rural landscape in 1980s and requested ICOMOS, IUCN and IFLA to consider the requirements for nomination of rural landscape heritages. Since then, the concept of rural landscape progressed and was prioritized among the world heritage nominations.

In the 16th session of World Heritage Conference in 1992, amendments were made to the operative clauses concerning the standards of cultural heritages. The cultural landscape concepts were thus adopted and the cultural landscape categories were therefore included with respective standards making it a special classification in cultural heritages emphasizing “the combined works of nature and of man” and also a bridge between nature and culture. This progress fully elaborates the concept of heritages has been changing from elite, great, static towards common, general and dynamic（Han 2007）[32].

2.2.2 Definition and Categories

Cultural landscapes are cultural properties and represent the "combined works of nature and of man", They are illustrative of the evolution of human society and settlement over time, under the influence of the physical constraints and/or opportunities presented by their natural environment and of successive social, economic and cultural forces, both external and internal (UNESCO 2012) [33].

The term "cultural landscape" embraces a diversity of manifestations of the interaction between humankind and its natural environment.

Cultural landscapes often reflect specific techniques of sustainable land-use, considering the characteristics and limits of the natural environment they are established in, and a specific spiritual relation to nature. Preservation of cultural landscapes can contribute to modern techniques of sustainable land-use and can maintain or enhance natural values in the landscape. The continued existence of traditional forms of land-use supports biological diversity in many regions of the world. The preservation of traditional cultural landscapes is therefore helpful in maintaining biological diversity.

Cultural landscapes fall into three main categories, namely:

(1) The most easily identifiable is the clearly defined *landscape designed and created intentionally by man*. This embraces garden and parkland landscapes constructed for aesthetic reasons which are often (but not always) associated with religious or other monumental buildings and ensembles.

(2) The second category is the *organically evolved landscape*. This results from an initial social, economic, administrative, and/or religious imperative and has developed

its present form by association with and in response to its natural environment. Such landscapes reflect that process of evolution in their form and component features. They fall into two sub-categories:

① a relict (or fossil) landscape is one in which an evolutionary process came to an end at some time in the past, either abruptly or over a period. Its significant distinguishing features are, however, still visible in material form.

② a continuing landscape is one which retains an active social role in contemporary society closely associated with the traditional way of life, and in which the evolutionary process is still in progress. At the same time it exhibits significant material evidence of its evolution over time.

(3) The final category is the *associative cultural landscape*. The inscription of such landscapes on the World Heritage List is justifiable by virtue of the powerful religious, artistic or cultural associations of the natural element rather than material cultural evidence, which may be insignificant or even absent.

As in Table 2-2, by April 2013, there are 85 Cultural Landscapes with Outstanding Value in the world listed in the World Heritage. Among these cultural landscapes, there are 21 rural cultural landscapes, which take up 25% of the total amount (Figure 2-3). But from the geographic distribution, 50% of the Cultural Landscape Properties distributed in Europe and North America regions and only 23 spots in Asia and the Pacific region (Figure 2-4), In these 23 spots, only 3 of which belong to cultural landscape while there are 12 in Europe and North America region (Figure 2-5). This result does not reflect fully of the fact that the agrarian cultural traditions deeply rooted in Asian countries for thousands of years as well as the diverse rural landscapes in this region. However, the result does prove Taylor's well-known idea on cultural landscape that the value of rural cultural landscape is not managed properly in Asia (Taylor 2009) [34]. Hence, the theoretic and practice development of cultural landscape in the field of heritage preservation in Asia is now relatively insufficient but filled with potential simultaneously.

Table 2-1 Category of Cultural Landscape in World Heritage Inscription[1] [35]

Category	Definition	Landscape for inscription	Cultural value for evaluation
intentionally designed landscape	landscape designed and created intentionally by man	Garden, park, cemetery and building (Group)	Artistic concepts (Especially concerning the design concepts and techniques of gardening)
		Canal (Including the bridges, Watergates, etc.)	Building constitution and landscape design
organically evolved landscape	（i）landscape in which an evolutionary process came to an end at some time in the past, either abruptly or over a period	The ancient and medieval remains and their surrounding landscapes	Culture and civilization of the past and their remaining landscapes
		Industrial heritages (railways) and natural habitats along the rail	Advanced industrial technology
	（ii）landscape which retains an active social role in contemporary society closely associated with the traditional way of life, and in which the evolutionary process is still in progress.	Agricultural landscape and agricultural settlement landscape	The protection and continual of the organic combination of human business and natural terrain (land-use ways) and its close connection with traditional farming techniques and related landscapes
		Settlement landscape and natural landscape	The coordination of settlement landscape and natural landscape
		Natural landscapes that are used for pasturage and relative facilities	The coordination of human and nature
		Polders	Special land-use way in this region
		Natural landscape with strong artificial colors	Holistic landscape of all archeological remains
associative landscape	landscape with powerful religious, artistic or cultural associations of the natural element	Mountainous area and rocks, etc.	Cultural and spiritual center (The cultural significance of sacred places for indigenous people)
		Mountains, forests, and temples, etc.	Cultural and spiritual center (The cultural significance of religious sacred place, sanctuary, etc.)
		Coastal landscape	Livelihood places for indigenous people which is still in use
		Mountain landscape and rural landscape	Significance as artistic activities materials or stage

[1] Table source: 山村高淑, & 張天新 (2004)

Table 2-2 Number of Cultural Landscape Sites in World Heritage List[1] [36]

Region	Country	Cultural landscape property	Agricultural Landscape property
Africa	Ethiopia	1	1
	Gabon	1	0
	Kenya	1	0
	Madagascar	1	0
	Mauritius	1	0
	Nigeria	2	0
	Senegal	2	0
	South Africa	2	0
	Togo	1	1
	Zimbabwe	1	0
Asia and the Pacific	Afghanistan	1	0
	Australia	1	0
	Azerbaijan	1	0
	China	3	0
	India	1	0
	Indonesia	1	1
	Iran	2	0
	Israel	1	0
	Japan	2	0
	Kazakhstan	1	0
	Kyrgyzstan	1	0
	Lao	1	0
	Lebanon	1	0
	Mongolia	1	0
	New Zealand	1	0
	Papua New Guinea	1	1
	Philippines	1	1
	Syria	1	0
	Vanuatu	1	0
Europe and North America	Andorra	1	1
	Austria	3	2
	Canada	1	1
	Czech	1	0
	France	5	1
	Germany	3	0
	Hungary	3	1
	Iceland	1	0
	Italy	5	1
	Lithuania	2	0
	Norway	1	0
	Poland	2	0
	Portugal	3	2
	Russia	1	0
	Spain	3	1
	Sweden	1	1
	Switzerland	1	1
	UK	4	0
	USA	1	0
Latin America and the Caribbean	Argentina	1	0
	Brazil	1	0
	Colombia	1	1
	Cuba	2	2
	Mexico	2	1

[1] Data Source: http://whc.unesco.org/en/culturallandscape/

Figure 2-3 Number of Rural Cultural Landscape Properties

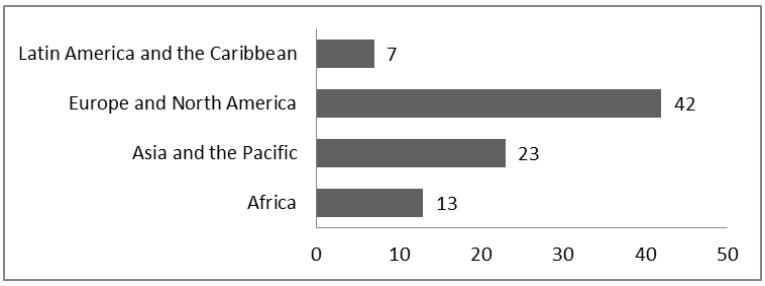


Figure 2-4 Number of Cultural Landscape Properties in Different Region

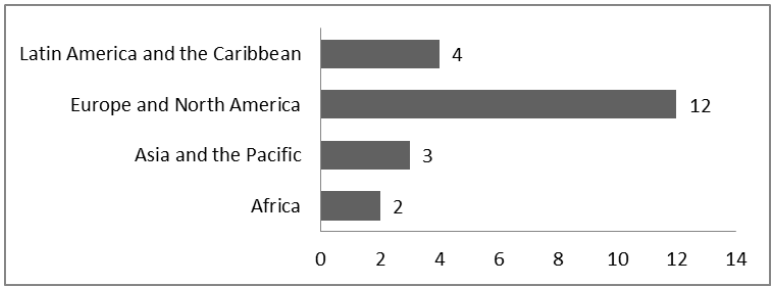


Figure 2-5 Number of Rural Cultural landscape Properties in Different Region

2.2.3 New Trends in Cultural Landscape Conservation

In the international heritage preservation, heated discussion on cultural landscapes is found continuously and the influence of this issue has been expanding. This phenomenon represents fully of the capability that cultural landscape has on the openness of issues in discussion and escalation of considerations. The evaluation techniques and methodologies on the values of cultural landscapes have been improving. The authenticity and completeness in this dynamic improvement are thus the focus of this field of study. Issues concerning landscapes are therefore becoming the management agendas at local and international scales under heated discussion.

Concerning landscapes, one of the most noticed issues is the Recommendation on the Historic Urban Landscape passed by the UNESCO on November 10th, 2011, which marked the first step of the heritage preservation of cultural landscapes reaching into urban historic heritage preservation and thus became the pioneering approaches in urban historic heritage preservation. Before this recommendation, however, the heritage sites of cultural landscapes were not firmly included in the urban heritage preservations. As the discussion in the field of cultural landscape was in heated debate, the rural landscape, which is undergoing rapid change and is also closely related to the urbanization and natural resources usage such as land-use, has received attentions from multiple areas of discussion. The holistic understanding of the traditional value of rural landscapes and their classification and management approaches are thus investigated in many countries (Han 2012) [37].

2.3 Development of Theory and Practice of Cultural Landscape in China

In China, the importance of the nomination of World Heritage has also brought up people's attention on cultural landscapes and thus regards highly on the value of cultural landscapes.

2.3.1 Cultural Landscape in China

Since Cultural Landscape is a concept originated from the academia of cultural geography in the west, questions and confusions arose when this concept was introduced to China, hence once difficult in its development of theories and practices. In theoretic aspect, cultural landscape is field of study under human geography, but in practice, with the high rise attention on the application to World Heritage nomination and the rising amount of World Heritages in China, cultural landscape gradually receive the attention from the international societies and thus lead to suspicions and misunderstandings that forced Chinese scholars to respond（Han 2004）[38].With the expectations from the international societies on China, the World Heritage Center mentioned in their analysis on the distribution of cultural landscape World Heritages in the world that the World Heritage should reflect fully of the cultures in the world. Chinese culture, an unique culture jointly created by the nature and human philosophical thoughts that dates back to thousands of years ago, must be included in the cultural landscape systems with the Asia-pacific regional cultures to complete the

world (Fowler 2003) [39]. Also, it is recognized in the international societies that Asia has remarkable cultural landscapes and China will be the representative of Asian cultures (Taylor, Han and Tian 2007) [40].

With diverged views on the nature from the east and the west (Han 2006)[41]， the dualistic value of the human in opposite to the nature that originated from the western culture in World Heritages received challenges from Asian scholars.（Han 2007）[42]。

Currently the World Heritages under the classification of cultural landscape in China are Lushan National Park, Mount Wutai and West Lake Cultural Landscape of Hangzhou and these are all traditional areas of scenic and historic interest in China. However, in recent years, with the rising attention on the cultural landscapes in China, academic studies are mostly focused on traditional scenic spots. The West Lake in Hangzhou as the symbol of oriental culture (Han 2009) [43]，for an example, has long been the tourist attraction and with public activities and the scene itself interacting with each other for a thousand years, it finally becomes a scenic spot with aesthetic beauty that represents Chinese culture highly. (Shi Katagiri and Ishikawa 2011) [44]。

China as a country with long history and distinctive culture, the three categories of cultural landscapes can all be found abundant. For the first category of the landscape designed and created intentionally by man, classical Chinese gardens have been registered as World Heritages. As in the case of the second category of the organically evolved landscape, China has great potential in this classification for her long history enabled the development of varied agricultural production methods, settlement types and utilization of natural resources that need further systematic organization and investigation. While in the case of the third category of relic landscapes, China can serve to great contribution in the depth and breadth of human knowledge in nature because this classification of World Heritage is lack in the understanding of natural value based on humanism and thus the registered items are mostly related to religions or primitive worship of nature. For the contribution to the international societies, China has special credit on her unique cultural landscapes that involve three categories of cultural landscapes together in one. The classic example will be the cultural landscape in the scenic and historic interest areas in China. Their shared characteristics are the outstanding dual features in human and natural elements and also joint works of human and nature. They are designed works by human and as human inhabitation they also organically evolve with time and are highly related to

culture, arts and religions. They are the practice and witness of the human-nature relations of Chinese people and also the symbol of Chinese culture (Han 2010) [45].

Han also pointed out that cultural landscape has gradually been recognized in China. The cultural landscapes are now included in the national preparation list and the nomination are also included into the agendas. However, with the unclear knowledge on cultural landscape concepts and the value, ICOMOS-IFLA checklist has not been used on registration and management of cultural landscapes in China. With the national heritage system on cultural landscape not yet been thoroughly established, the systematic organization, structure and representativeness of the cultural landscapes on the pre-nomination list will certainly be influenced; hence hastened system establishment is encouraged.

In comparison, though in Asia like China, Japan has advanced understanding in cultural landscape studies. Not only the Landscape Act was implemented, detailed explanation on this act was also conducted to the public (MLIT 2004) [46], Further, the cultural landscapes related to agriculture, forestry and fishery are all investigated in detail (AFCA 2005) [47].

2.3.2 Classification of Cultural Landscape Types

In China, the concept for cultural landscape follows the concepts that in world heritage but with a slight difference in the classification.

The heritage preservation system in China is gradually built and accomplished with considerations of the international experience. This system also has undistinguishable targets and disciplines in its heritage classification that follows the line of “natural-cultural” and “tangible-intangible”. Cultural landscape as a category that is inseparable from local cultural traditions, different characteristics can therefore be found in different places. Combining local characteristics of history and culture, some scholars attempted to classify cultural landscapes in China into following categories (Li and Xiao 2009) [48]：

Table 2-3 Category of Cultural Landscape[1]

Category	Definition		Focus
Designed landscape	Landscape works by designers in history with historic value concepts and aesthetic principles that represent artistic styles and accomplishment of certain era in different places.		Holistic design of construction groups of ancient gardens, mausoleums and their surrounding environment.
Remains landscape	Construction or sector remains that witnessed important historic events or documented relative historic messages but now abandoned or lost of their original functions.		Remains as witnesses of history, their sociocultural significance is more important than their artistic accomplishments and functions.
Locus landscape	Landscapes shaped by the users' behavior demonstrate the sedimentary of time in space and human activities give cultural significance to this kind of landscapes.		Including squares that are used for cultural or ritual activities and places with specific function.
Settlement landscape	A set of historic buildings, constructions and surrounding environment that form a settlement landscape of constructions automatically. The settlement landscape continues corresponding social functions and demonstrates historic change and development.		Including historic villages and street blocks.
Area landscape	Scenic spots	Landscape that is composed of natural environment and cultural marks left by human activities in this natural environment.	Landscape areas with natural environment as background but also with strong connection to religion, art and culture.
	Cultural Routes	A kind of cultural landscape that is cross regional and takes certain cultural event as clue for linear distribution.	Also known as heritage corridors.
	Heritage Area	Regional landscape that linked fractures of cultural elements via mountains, wetlands rivers and other factors.	Taking one natural element or artificial traffic system as ties between areas with identical cultural characteristics.

[1] Table Source : Li, H. & Xiao, J. (2009)

In 2010, Ji-xiang Shan published Into the World of Cultural Landscape Heritages as he was the director of the State Administration of Cultural Heritages and he also made an attempt to classify cultural landscapes in China with characteristics as following （Shan 2010）[49].

Table 2-4 Category of Cultural Landscape[1]

Category	Definition
Urban Cultural Landscape	Formed with longer history with distinctive local characteristics and significant aesthetic value. Historic street blocks constitute the basic units that form this landscape.
Rural Cultural Landscape	Reflecting sustainable land-use concepts and techniques under certain environment conditions and demonstrating the coordination of agriculture and rural landscape between man and nature.
Scenic Cultural Landscape	With rich aesthetic significance and influencing people's lives, thoughts and artistic creations via aesthetic experience and activities. A landscape composed of natural and cultural elements.
Remains Cultural Landscape	Landscape that are with outstanding value on construction or on the interaction between nature and human from the aspect of history, aesthetic beauty, ethnography or anthropology.
Religious Cultural Landscape	During the formation of landscape, the development of religious influence mostly among all human factors that join the formation.
Folk Cultural Landscape	Traditional customs or production that are with regional characteristics during the start, formation, diffusion and integration of folk customs within certain range.
Industrial Cultural Landscape	Landscapes developed from industries that are of historic, artistic and historic value and also document the economy, politics, culture and social development of a generation.
Martial Cultural Landscape	Landscapes that are resulted from historic military affairs or wars and documented the pattern of wars and the development of military technology.

[1] Table Source :单霁翔. (2010)

2.3.3 Rural Cultural Landscape

The formation of rural landscape is derived from the progress that natural appearance evolves to cultural ecology. This progress does not usually end in certain historic period but constantly evolve with time and thus a joint product of material and spiritual world. Rural cultural landscape usually reflects sustainable land-use pattern and with this as foundation further form a unique local culture that has distinctive cultural diversity and biodiversity interacting with each other.

There are three factors that serve to restrict the development of rural cultural landscape including natural environment, economic environment and sociocultural environment.

Natural environment includes the climate, water and vegetation elements such as precipitation amount will directly influence the construction pattern of residence in each area. Usually in mountainous villages the settlements are more scattered and with smaller scale due to the ups and downs of the terrain and few level grounds are available for bigger settlements. Most importantly, with the farmlands scattering in the mountains, settlements that are densely concentrated will lead to difficulties for the villagers traveling to working spots and thus no benefit for production.

Concerning the economic environment, for settlements that depend primarily on agriculture production, the activity range is mostly the area that farmlands, pasturages, forests or fish farms cover. The agricultural lands amount is highly relevant with the prosperity of the settlements.

The sociocultural environment refers mainly to the non-material factors that involve in the formation and development of rural settlements. The long-term historic development of each ethnic group, for example, will form their unique production and live traditions and create different traditions and customs for production. This process serves to influence the formation of each settlement and further contribute to the formation of varied cultural landscapes.

According to the characteristics of each rural productive life, rural cultural landscapes can be divided into following 7 categories:

Table 2-5 Category of Rural Cultural Landscape[1]

Category	Characteristic
Agricultural Settlements Landscape	Focusing on the farmland cultivation
Fruit Farming Settlements Landscape	Focusing on the cultivation of fruit trees
Livestock Farming Settlements Landscape	Focusing on the husbandry of livestock
Fishery Settlements Landscape	Focusing on fishing.
Handiwork Settlements Landscape	Focusing on the manufacturing of products
Mining Settlements Landscape	Focusing on the mining of resources.
Touristy Settlements Landscape	Focusing on the touristic receptions

2.4 Previous Study on Rural Cultural Landscape in Chengdu

In fact, due to the unfamiliarity with the concept of cultural landscape, the domestic studies on the rural landscape of Chengdu Plain in China have never precisely used this aspect for investigation. But the studies on rural cultural landscape have better development since the 21th century.

2.4.1 Rural Community of Linpan on Chengdu Plain

In Sichuan Basin, including Chongqing, it is very common that rural settlements are small and scattered and is widely distributed in the plains, hills and mountains. It is also noticed that the rural settlements are closely related to bamboo forests and farmlands. This kind of scattered settlement distribution is different from that in northern or southern provinces because it is deeply influenced by the local environment and social historic human factors. It is because of the local history, culture, agricultural production and immigration society that serve together to form this unique pattern of settlement distribution（Fang 2012）[50].

Linpan is a special term referring to the rural settlements in Chengdu Plain and the usage of this term can date back at least to the Qing Dynasty documents（Wang 1987）[51].The size of Linpan is usually small but dense in distribution, which is a classic rural settlement pattern in this area and they are either with sole or a couple of households and thus different in sizes. Linpan is a style of living and also a method of production that is widely distributed in the Chengdu Plain and hilly areas, a typical

[1] Table Source :单霁翔. (2010)

case can be found in the irrigation area of the Dujiangyan Irrigation System of Chengdu. While in the case of Chengdu Plain, it is the largest plain in Sichuan Basin and has the best condition in geographic environment and thus better for agriculture. The Chengdu Plain is also the center of Bashu Culture and the most economically developed region in Sichuan Basin. It is also found that Linpans are thoroughly developed in this region. Although there are no unified definitions on the Linpans in Chengdu Plain, scholars of the previous studies had given explanations or elaborations according to their observation and focus.

1，Strolling along Pingba[1] of west Sichuan, as lines of bamboo or trees come suddenly into sight in vast and wide fields, proceed walking along the track and you will be able to see on or a couple of households that is known as Linpan. Forests, canals, households and farmlands are the primary elements that constitute Linpan（Duan and Liu 2004）[52]。

2，Rural households in Chengdu Plain that are surrounded by forests and with the house as center if viewing it from above but if viewing it from the side, it looks like a green round plate for grinding with the house edge visible among trees sometimes… the [settlement] pattern is like an oasis floating on the sea… this is why this kind of landscape is called Linpan（Ji 2008）[53].

In recent years, Linpan as a special rural settlement pattern has received attentions among the academic studies concerning rural villages in Chengdu Plain in China. With the implementation of New Village Construction Movement, traditional rural villages are reformed. This policy effect has become academic research interests since 21st century, especially the conservation and development of Linpan and related settlement types that are studied by the colleges and institutions in Chengdu and Chongqing. Among the research, some took the philosophical viewpoint to evaluate the value of Linpans（Yang 2011）[54], while some took the aspect from the landscape resource preservation and development of Linpan and further classify it for the discussion on its development and usage（Sun 2011）[55]，While some studies regard Linpan as a system and focus on the evolvement of forms and spatial structure（Zhang 2008）[56], Also, there are studies that focus on the discussion on how the design and planning of Linpan should be under the New Village Construction Movement and earthquake revivals (Fan 2009)[57]. While due to the plants are one of the most

[1] Pingba means alluvial plain in Chengdu.

important elements that construct the landscape of Linpan, there are also studies concerning the diversity of plants (Xu 2010)[58]，Further, the classification of settlement types and proposals for improvement of vegetation (Yang 2009)[59] are also available.

With so many areas of interests, however, these studies are focused on the rural areas surrounding the Chengdu City. Though there are studies examining this area from the aspect of rural cultural landscape for the analysis on regeneration (Shi and Ishikawa 2012) [60]，the object of study is still focused on the narrow greenbelt (Shi 2011)[61]. With the vast amount of Linpans distributed in Chengdu Plain, the aforesaid studies are basically taking small scale of rural areas near Chengdu City as case study and not revealing the holistic situation of Chengdu rural areas and not analyzing and discussing the relation of Dujiangyan Irrigation System and the rural areas. Hence, in general, the depth and breadth of this area of study needs advancement.

2.4.2 Rural Area in Dujiangyan City

In ancient Chinese culture, there were also civilizations centering the irrigation and thus prosperous. In China, water control, water transportation and large-scaled water supply constructions for irrigation had been conducted (Mogi 2010)[62]. The Sichuan Basin, which is located in the southwest corner of China, has rice as its primary agriculture product; hence the irrigation technique is of paramount importance. The largest irrigation construction in the Chengdu Plain of Sichuan Basin is the Dujiangyan Irrigation System that is constructed by Lee Bing and his son and a large number of labors to diverge the river in B.C. 250. The total irrigation measurement of the canals diverged from the Dujiangyan Irrigation System is estimated to be 200,000ha (Needham 1971)[63].

In the academia of China, there are fewer studies concerning the rural areas of Dujiangyan City that serve to be the origin of irrigation works of the Country of Heaven. Due to the Mount Qingsheng and the Dujiangyan Irrigation System in Dujiangyan City was listed among World Heritages in 2000 (WHC 2012) [64], Chinese academia focus more on the history of Dujiangyan City and the technical value of Dujiangyan Irrigation System (Cao, Liu and Er 2010)[65], while less attention are put on issues other than items of high heritage value. Most studies are focused on the characteristics and changes of rural landscape around the heritage sites;

hence lead to the lack of sounded theoretic foundation of the planning and design of average rural areas.

In fact, except from parts of the research have discussed the Dujiangyan Irrigation System through Chinese ancient water conservancy studies (Morita 1974)[66], most studies concerning the Linpan areas of Dujiangyan are conducted with the 2008 Wenchuan Earthquake[1] as a turning point for Dujiangyan City reconstruction. Among these studies, a research with the participation of Tokyo University, Japan on the earthquale revival of Dujiangyan City (Ishikawa 2010)[67] is found to propose three major principles:

Principe 1: Forests are the source of the nurturing of all things. It is therefore important to bring back the forests destroyed by the earthquake and to preserve them.

Principle 2: Rivers and water networks as the shared capital of the society that has been cultivated by the history for 2300 years will be continued and inherited.

Principle 3: Cultural landscapes that involve forests and Linpans that developed from the nodes of waterways should be inherited and maintained and activate the contemporary conditions in the meantime.

Some of the researchers from Tokyo University had conducted detailed investigations on individual Linpans of the rural areas of Dujiangyan City (Ishikawa et al. 2011)[68], Studies are also conducted on the earthquake revival plans that focused on the rural areas of the greenbelt surrounding downtown Dujiangyan City (Shi and Ishikawa 2012)[69]，but they need further advancement on analysis.

2.5 Summary

Cultural Landscape is a western concept which was firstly discussed in Germany. In late 19th century, German geographer O. Schuluter classified landscapes in two varieties including the original landscape and the cultural landscape.The American geographer Carl Ortwin Saucer is the most influential scholar concerning the field of cultural landscape in 20th century. He defined cultural landscape was something “fashioned from a natural landscape by a culture group. Culture is the agent, the natural area is the medium, the cultural landscape the result”

[1] It is also called as 2008 Sichuan Earthquake.

In 1992, the cultural landscape concepts were adopted by World Heritage Center and the cultural landscape categories became a special classification in cultural heritages emphasizing “the combined works of nature and of man”. Cultural landscapes fall into three main categories, and Rural Cultural Landscape is included in the “continuing landscape”.

China as a country with long history and distinctive culture, the three categories of cultural landscapes can all be found abundant. In China, Rural Cultural Landscape has been defined as “…reflecting sustainable land-use concepts and techniques, demonstrating the coordination of man and nature.” The heritage conservation system in China is gradually built and accomplished with considerations of the international experience. This system also has undistinguishable targets and disciplines in its heritage classification that follows the line of “natural-cultural” and “tangible-intangible”. Cultural landscape as a category that is inseparable from local cultural traditions, different characteristics can therefore be found in different places.

Linpan is a special term referring to the rural settlements in Chengdu Plain and the usage of this term can date back at least to the Qing Dynasty. In recent years, Linpan as a special rural settlement pattern has received attentions among the academic studies concerning rural villages in Chengdu Plain in China. But there are fewer studies concerning the rural areas of Dujiangyan City that serve to be the origin of irrigation works of the Country of Heaven, hence lead to the lack of theoretic foundation of the planning and design of average rural areas in this region.

Chapter 3

Characteristic of Rural Cultural Landscape in Metropolitan Area of Chengdu

Chapter 3. Characteristic of Rural Cultural Landscape in Metropolitan Area of Chengdu

3.1 Introduction

The city of Chengdu is the economic, political and cultural center of Sichuan Province. With its location situating between the Tibetan Plateau and Chengdu Plain, the great terrain difference that is higher in the northwest and lower in the southeast makes the rivers in this area flowing from the northwest to the southeast and running through the Chengdu Plain, which is beneficial for the development of the agricultural development.

3.2 Location of Sichuan and Chengdu

3.2.1 Sichuan Province

Figure 3-1 Location of Sichuan Province[1]

[1] Data source: ArcGIS Online ESRI, World Administrative Divisions (2011/11/8), World

Figure 3-2 Landform and Administrative Divisions of Sichuan Province[1]

Sichuan is located in western China and is the important joint of southwest, northwest and central China. It is also a traffic corridor that links south and central China,

Countries (2011/11/8), Figure Constructed by author.

[1] Satellite Image Source: SPPG. (2013) *Sichuan Overview*. Figure constructed by author

connects southwest and northwest China and channels Central, South and Southeast Asia. Sichuan covers an area of 485,000 square kilometers, ranking No.5 in China. It governs 21 cities (autonomous prefectures) and 181 counties (county-level cities and districts).

The terrain of China's mainland forms a flight of three steps in terms of altitude. Sichuan lies between the first step, namely Qinghai-Xizang Plateau and the second step, namely the Middle-lower Yangtze Plain. It is high in the west while low in the east, demonstrating a distinct disparity in terms of altitude. Plateaux and mountainous areas can be seen in west Sichuan with elevations of over 4,000 meters above sea level, while basins and hilly areas can be found in the east, with elevations of 1,000 to 3,000 meters above sea level.

The whole province can be divided into three parts: the Sichuan Basin, Sichuan Northwest Plateau and Sichuan Southwest Mountains (BSMSP 1999) [70]. Sichuan has a complex and varied topography with mountains and plateaus being the most outstanding feature. There are four geomorphic types, that is, mountainous areas, hilly areas, plains and plateaus, accounting for 77.1%, 12.9%, 5.3%, and 4.7% respectively of the gross area of Sichuan (SPPG 2013) [71].

3.2.2 Metropolitan Chengdu

Chengdu is located in the central area of Sichuan Province and is at the west of the Sichuan Basin between 102°54'E～104°53'E and 30°05'N～31°26'N. It ranges 192km from east to west and 166km from north to south making its total measurement at 12390km^2 and 4320km^2 of which being farmlands. Located 1852km from the East China Sea and 1090km from the South China Sea, Chengdu also neighbors Deyang and Ziyang to the east, Ya'an and Meishan to the west (Figure 3-2).

The city of Chengdu as the metropolitan area of Sichuan Province is one of the mega cities in China and also the center for education, technology, commerce, finance and culture in southwest China. The administrative division of Chengdu includes 9 districts, 6 counties and 4 county-level cities that are under deputy administration (Figure 3-3). According to the statistics, up to October 31, 2010 the population had reached 14,047,625 persons. Chengdu, a historic city built in 611 BC, is also the city that has never changed its location for the longest period of time.

Figure 3-3 Administrative Divisions of Chengdu Metropolitan[1]

3.3 Landscape Structure of Metropolitan Chengdu

3.3.1 Landform Characteristics

With the long geologic history, the strata in Chengdu expose more completely and the terrain in this area is higher in the northwest region and lower in the southeast, making its geology significantly different. The highest peak in Chengdu is the Daxuetang Peak of the Xiling Snow Mountains at 5353m above sea level.

The elevation in area ranges near 5000m from plains to mountains and thus forms various types of terrain features, chorology and human settlement forms. Mountains with elevation over 800m in the west are covered by the lush subtropical coniferous-broadleaf forests and those steep mountains above 2000m are uninhabited, hence the homes to many rare wild animals, especially pandas.

[1] Data Source: Chengdu planning museum (成都規劃館)

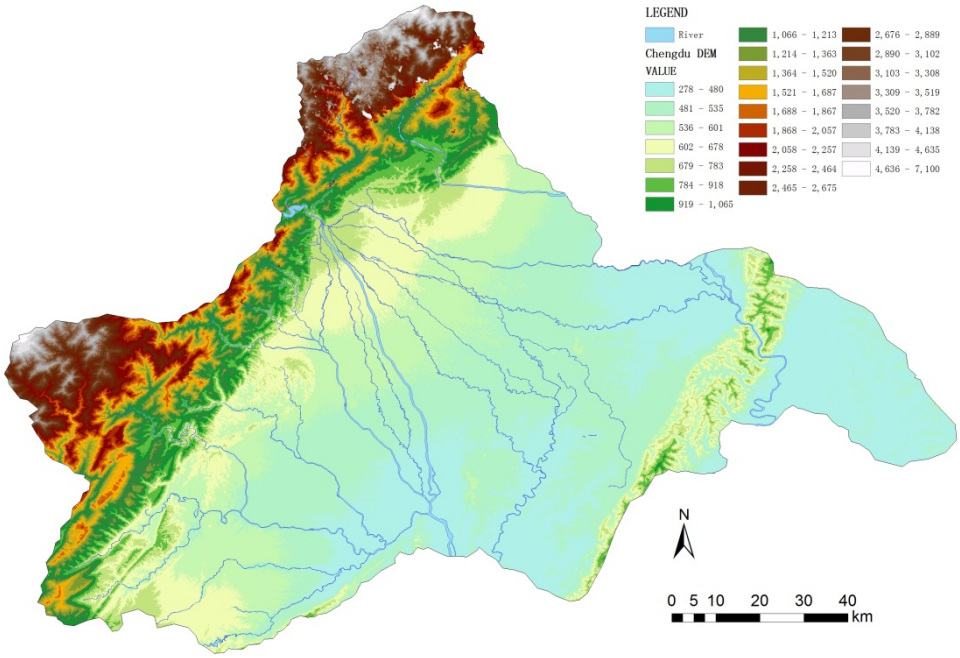


Figure 3-4 Landform of Chengdu Metropolitan[1]

Also, mountains with lush vegetation are important sources of water conservation. With the sharp change of terrain that is high in the west and low in the east, most rivers in Chengdu Plain flow from the northwest to the southeast and form a water system that springs from the mountains and irrigates the whole plain.

3.3.2 Land Use Characteristics

Based on the GIS data (Figure 3-5), the forest coverage in Chengdu City reaches 4315km^2 and the farmlands are around 7300km^2 in total. Though the size of the urban area is large, around 1094km^2, it only account for 8% of the total measurement of Chengdu City. As a result, approximately 57% of the lands in Chengdu City are the rural area, which is the largest of all land-use categories (Table 3-1,Figure 3-6).

[1] DEM data source: ASTER GDEM. Figure constructed by author.

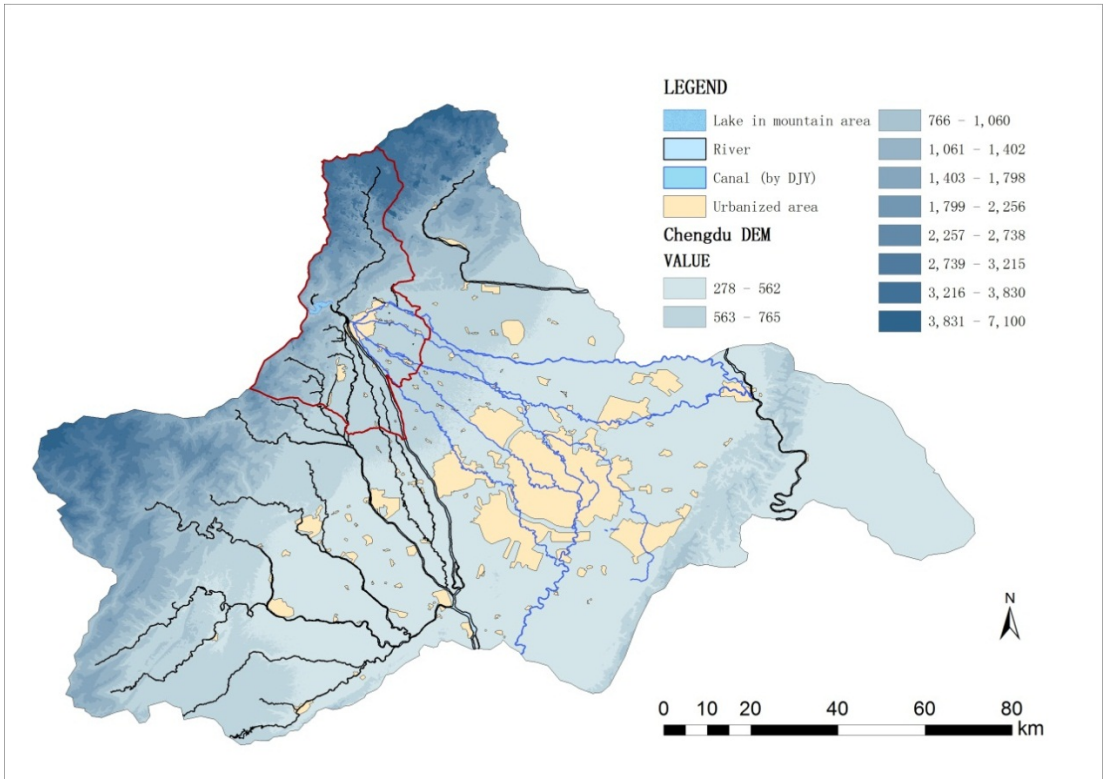


Figure 3-5 Land Use Map of Chengdu[1]

Table 3-1 Land Use Data of Chengdu

Item	Length(km)	Area(km^2)
Forest	-	4315.30
Lake, reservoir	-	6.02
Natural river (Minjiang River)	1118.28	121.46
Canals shaped by Dujiangyan dam	682.98	32.36
Urbanized area	-	1094.62
Agricultural land	-	7300.36

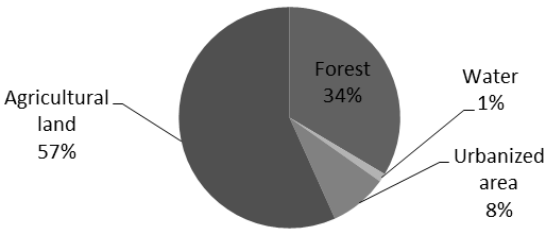


Figure 3-6 Share of Land Use in Chengdu

[1] DEM data source: ASTER GDEM. Figure constructed by author.

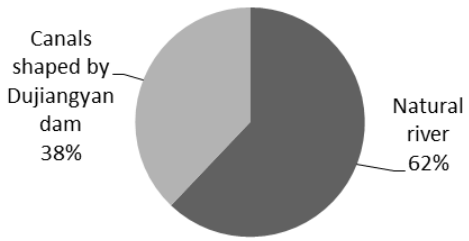


Figure 3-7 Length of Artificial Canals and Natural Rivers

In addition, rivers in Chengdu Plain can be further divided into natural rivers and artificially intervened rivers. From the table above, the water system that springs from the ancient Dujiangyan Irrigation System serves to irrigate half of the farmlands in Chengdu Plain and the length of this water system is approximately 682km (38%) (Figure 3-7) and total measurement at around 32km^2.

From the holistic point of view, high mountains, great rivers, widespread rural areas and large urban areas together constitute the structure and foundation to the landscape of the Chengdu metropolitan areas. Among all elements, the water system is the link between all landscape components.

3.3.3 Structure of Chengdu Metropolitan

In agrarian era, satellite towns were formed naturally centering the ancient city of Chengdu with the distance between these satellite towns almost equal (Zhao 2012) [72]. From Figure 3-8, it is inferable that up to Qing Dnasty, 6 important county centers (level 2) were formed surrounding the center city (level 1) of Chengdu; they are Guankou[1], Chongyang, Wuyang, Jiancheng, Zhao and Guanghan respectively. The distance between these cities and Chengdu is roughly between 40-60km and there are 12 regular counties (level 3) scattering between these county centers and the center city. The distance between each county to the nearest county is around 15-25km.

The mailing network known as the mail roads completed the communication between these satellite towns and the city. Based on the structure of these roads, a divergent road system with the ancient city of Chengdu as center was thus formed and further constituted the spider web road system that communicates the satellite towns and the urban area. This road structure still serves as the foundation of the urban system in the Chengdu metropolitan area (Figure 3-8).

[1] Guankou County is the old name (before 1988) for Dujiangyan city.

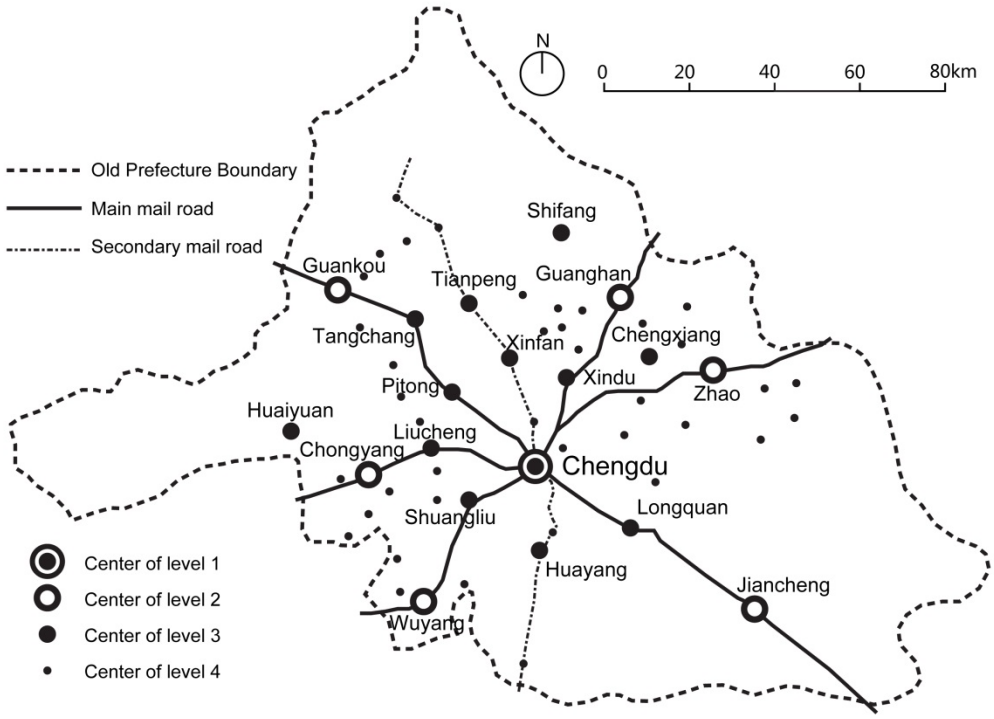


Figure 3-8 Urban System in Metropolitan Area of Chengdu[1]

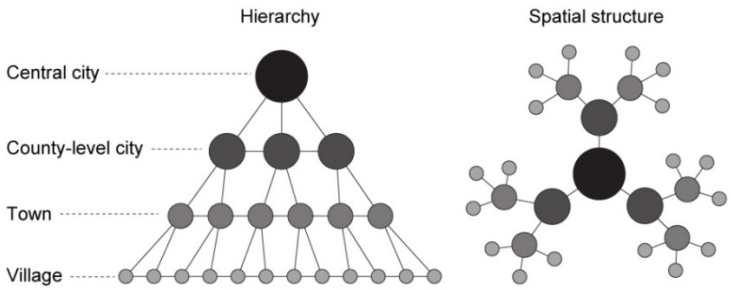


Figure 3-9 The Hierarchy and Spatial Structure of Metropolitan Area of Chengdu[2]

Also, this urban system network reflects the hierarchy in traditional Chinese culture. In management, the central city commands several county-level cities that lead several towns that further lead several villages. If this kind of vertical centralized hierarchy order is put to planar graph, the organization will be a traditional urban system layout centering a city and expanding in descend layer by layer (Figure 3-9).

With every central city and towns having command over lower ranks of jurisdiction, the urbanization area can be viewed as the nucleus and their command towns as

[1] Figure source:趙煒. (2012).
[2] Figure source: Fan, Y. (2009)

cytoplasm and together they make the whole cell of urban system structure (Figure 3-10). This kind of urban structure also constitutes the traditional urban-rural system in Chengdu Plain.

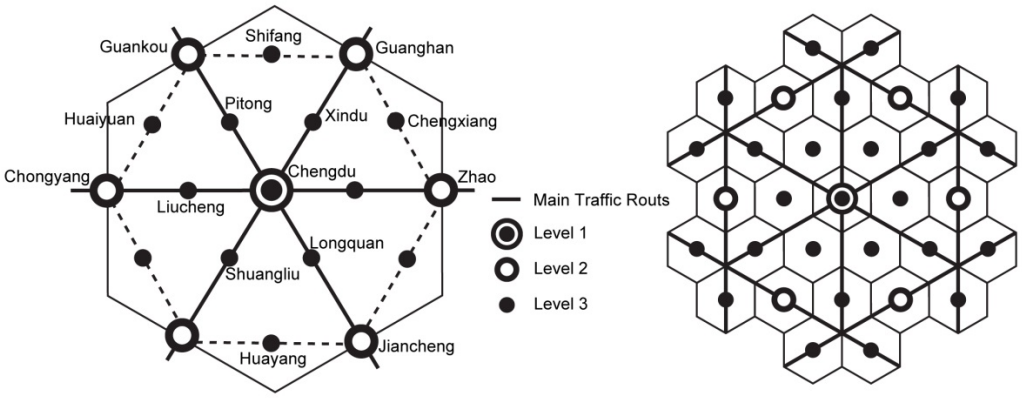


Figure 3-10 Urban-Rural Structure Pattern on Chengdu Plain[1]

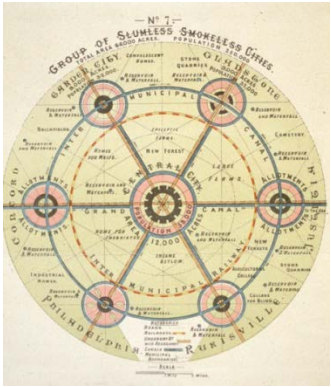


Figure 3-11 Garden City Pattern by Ebenezer Howard[2]

What is interesting is that the urban structure system formed in agrarian era in Chengdu metropolitan area happens to be identical to the ideal space structure of Garden City proposed by Ebenezer Howard in late 19th century (Figure 3-11). Hence it is inferable that the city of Chengdu indeed has the potential to be the modern Garden City.

[1] Figure source: 趙煒. (2012).
[2] Figure source: Howard, E. (1898). *To-morrow: A Peaceful Path to Real Reform*.

3.4 Classification of Rural Cultural Landscape in Chengdu

3.4.1 Rural Landscape Type in Chengdu

With the aforesaid natural geographic structure, the rural landscape in Chengdu City can be further classified into three major categories including mountain, alluvial plain and low hills.

As in the Figure 3-12 and Figure 3-13, mountain rural landscape are distributed mostly in the northwest piedmont, which is the inhabited rivers, valleys and gentle slope areas outside of the natural reserved zones. While in the case of alluvial plain rural landscapes, known as Linpan, are distributed in non-urbanized areas of in the plain where the population is dense and rice farming being the primary agriculture production. Also, rural landscapes on low hills are distributed in the east of the plain where there are people living and farming according to the terrain.

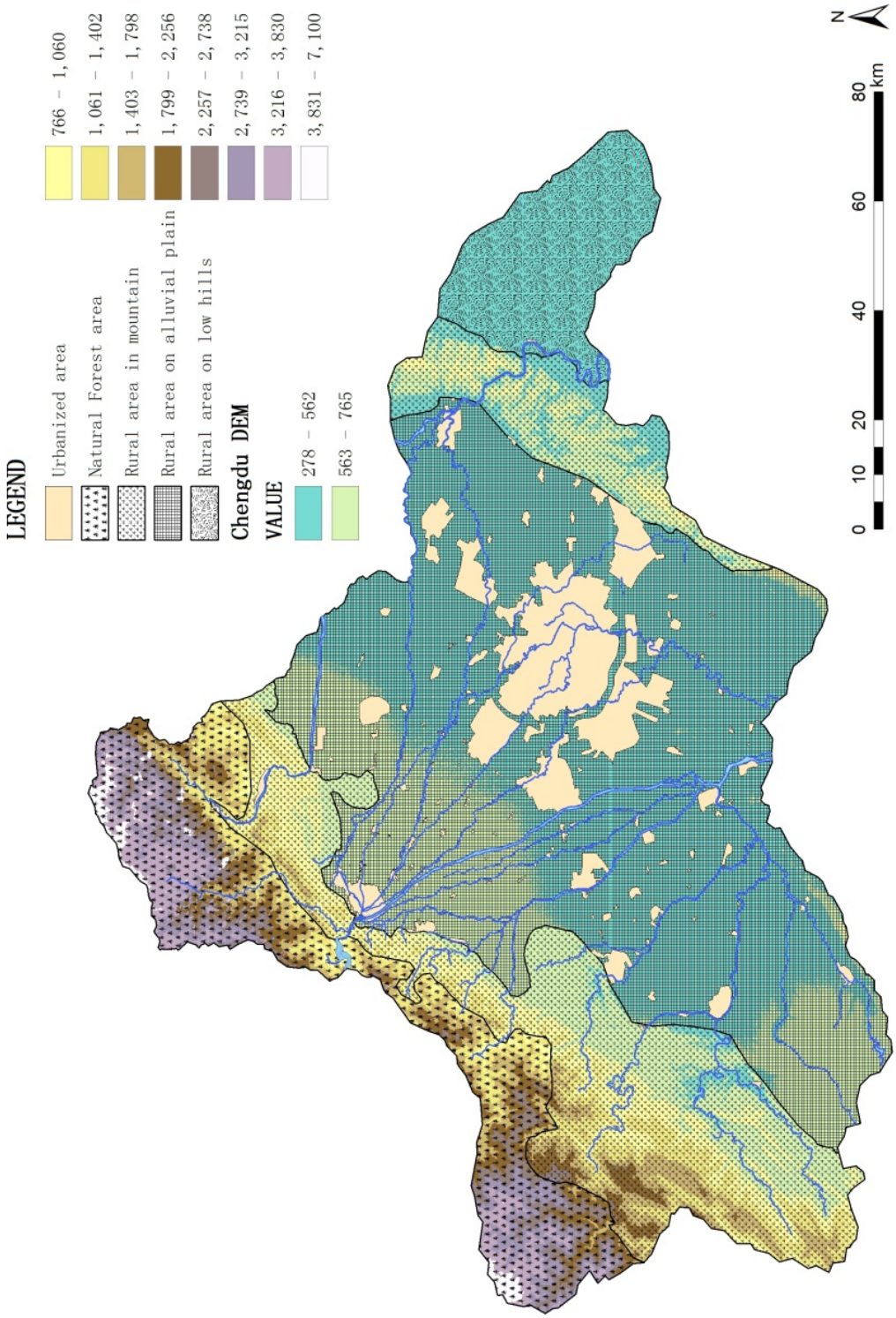


Figure 3-12 Classification of Rural Cultural Landscape in Chengdu[1]

[1] DEM data source: ASTER GDEM. Figure constructed by author.

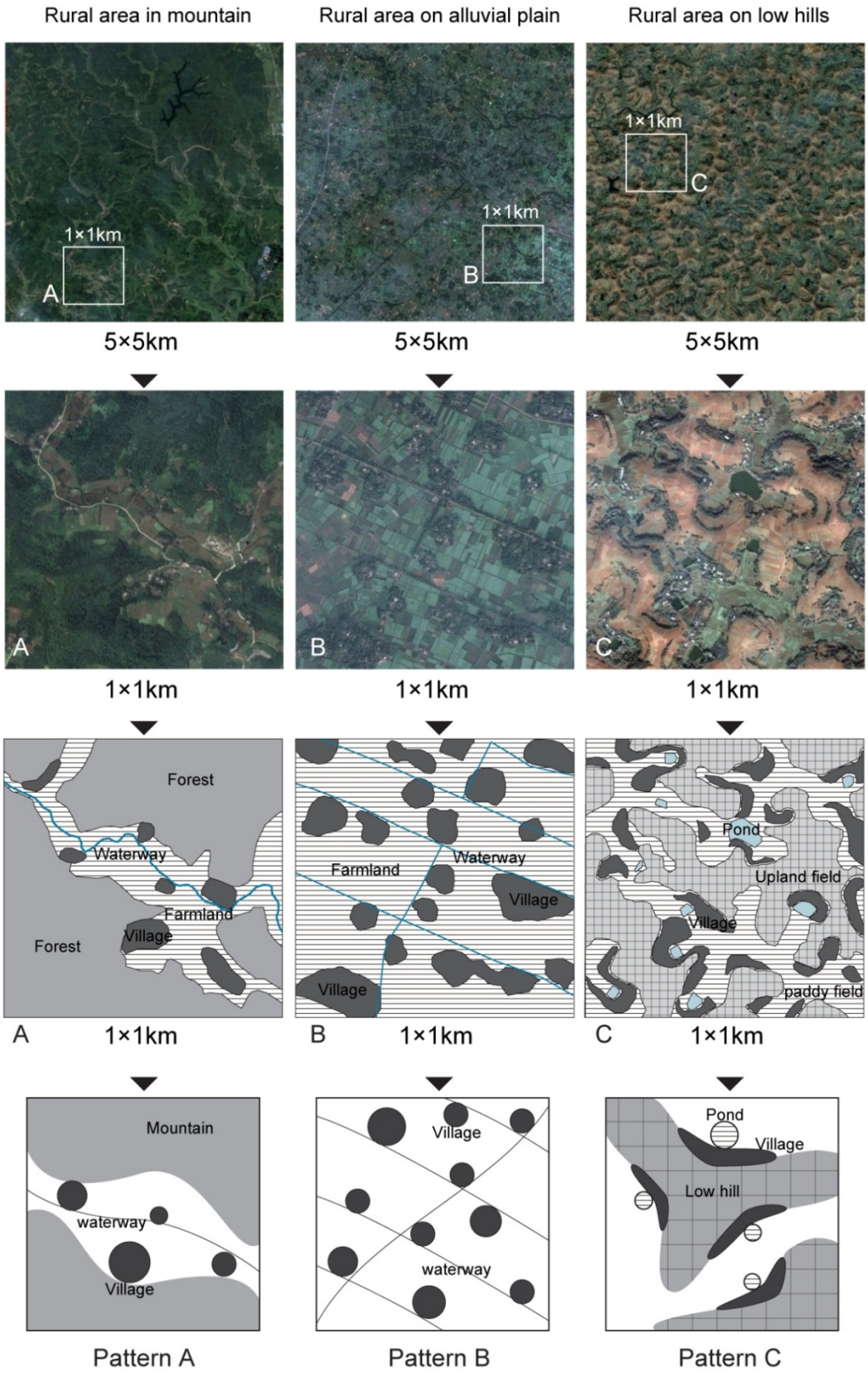


Figure 3-13 Types of Rural Landscape in Metropolitan Chengdu[1]

[1] Satellite image source: Google Earth. Figure constructed by author.

Table 3-2 Area of Three Types of Rural Landscape

Item	Area(km^2)
Natural Forest Area	1873.31
Urbanized Area	1094.62
Rural Area in Mountain	3191.90
Rural Area on Alluvial Plain	5854.53
Rural Area on Low Hills	855.71

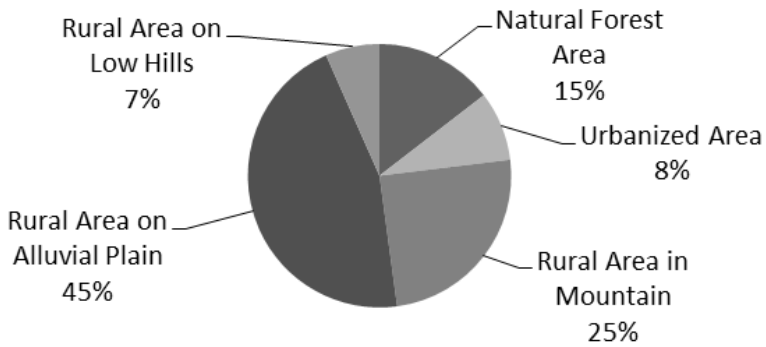


Figure 3-14 Share of Land Use Area of Three Types of Rural Landscape

3.4.2 Characteristics of Each Type

According to the GIS calculation, the total area measurement of the Rural Area in Mountain, Rural Area on Alluvial Plain and Rural Area on Low Hills are 3191.90km^2 (25%), 5854.53km^2 (45%) and 855.71km^2 (7%) respectively. (Table 3-2, Figure 3-14). And there are different characteristics among the three rural landscapes as below.

First, concerning the rural landscape in mountains, the distribution of villages has high relevance with the waters in mountains. The mountain water system can be divided with the watershed. In steep areas, settlements are mostly distributed in valleys where the inclination is between 0-10 degrees and dry faming lands of corns and other agricultural products are in slopes where the inclination is between 0-30 degrees. While in gentle slope areas, the rivers are blocked for the irrigation of terraced fields along the slope for rice farming. From the landscape point of view, the secondary forests planted for the life need of the villagers for agriculture, the water system, the dry farmlands, paddy fields and rural settlements distributed among the natural coniferous-broadleaf forests are the essential elements that constitute the landscape in this region.

In addition, in the case of the rural landscape in alluvial plains, the artificial irrigation system is densely distributed as spider web and it serves to connect the rural communities and also as the network between settlements and farmlands. The size of rural settlements is larger in this area and the agriculture is focused on the rice farming and dry farming of rape, corns and wheat are secondary options. With the need for fuel, production of farming facilities and the wood materials for building houses, villagers plant a large amount of arbors, bushes and bamboos around the house. These plants cover the houses and make these rural settlements look like islands floating on the ocean from afar. The water system (including the roads in rural areas), settlements and farmlands together are three major elements for the landscape of this region.

Further, for the rural landscape in low hills. With the limitation of bumpy terrain of the low hills, natural water system is not formed and artificial irrigation canals cannot form a large scale of artificial water system as well. As a result, the irrigation of agriculture in this area relies primarily on the rains gathered to the ponds or the runoffs. The primary crops here are thus mainly corns, wheat and dry land agricultural products. The hilltops are used as dry lands due to the gentle slopes. The rural settlements are distributed mainly in the bottom of valleys and are closely connected to ponds. From the landscape point of view, the dry lands on hilltops, forests in belt-like distribution along the slope, ponds and the rural settlements are the four major elements that constitute the rural landscape in this region.

From the analysis above, it is inferable that the natural terrains influence greatly on the distribution and direction of the water system and also bring great difference to the irrigation approaches. These differences are the fundamental factors that serve to form different types of rural landscapes.

3.5 Issues Concerned with Rural Cultural Landscape in Chengdu City

In contemporary China, the difference in the development between urban and rural areas is expanding. With the pauperization influencing deeply on the sustainable development of the rural social economy, Chengdu City is also included in such influence. To deal with these issues, the central government listed Chengdu City as the target city for the coordinated development of the urban and rural areas. Especially in the Urban and Rural Planning Law implemented in January 1st, 2008,

Chengdu City included the rural areas into the development planning for the holistic urban plans for the first time.

3.5.1 Three Rural Issues

The major issue in the increase of income for the farmers in Chengdu lies in the fact that the land is not enough for the demand from the large population. 0.75 acre of farmland on average is distributed to each farmer in this area by the end of 2004, which is 1/6 of world average record. Under this condition, to improve the economic wellness of the farmers, it is necessary that the surplus workforce of the rural area be shifted via fundamental approach of enhancing the urbanization level of rural areas. It is noticed that currently the urbanization of rural areas in Chengdu City is postponed by the industrialization. For better development of the economy of the city and resolving the "three rural issues", it is necessary that the urbanization of rural areas be hastened (Zheng 2005) [73].

3.5.2 Regeneration Plan for Urban and Rural Areas

The city of Chengdu is a typical case on "a large city with a large outskirt". This binary division has long been the hindrance to the development. The integration of rural and urban area is therefore the only way out for better development. In 2003, "five balances" on the technologic development concepts were proposed on the Third Plenary Session of the 16th CPC Central Committee. Next February, the Chengdu Municipal People's Government concluded the strategic arrangement of "the overall planning of the rural-urban economic and social development and encouragement of the integration of rural and urban areas". From 2005 to 2006, this issue was further discussed and proposed the concept of "panoramic Chengdu". In June 2007, it was approved that a National Experimental Zone of Comprehensive Coordinated Reforms for Balanced Urban and Rural Development be established in Chengdu, which took this opportunity for the acceleration of the integration construction of the rural and urban areas. In 2008 after the reconstruction for Wenchuan Earthquake [1], post-earthquake reconstruction plans were established and implemented. The next year, the reform on property rights of the rural area was further discussed to enhance

[1] It is also called as 2008 Sichuan Earthquake.

the transfer of lands and liberation and development of the productivity of rural areas and the goal of establishing the world garden city was also proposed.

The essence of the overall planning of rural and urban areas lies in the coordination of each resource of urban and rural areas to jump out of the limitation of city, town and village scales. With the infrastructures such as public service facilities and transportation expanding from urban to rural areas, the integration of these areas can thus be accomplished. The city of Chengdu takes the “three concentrations” (industries concentrate to development areas, farmers concentrate to towns, and lands concentrate to scale management) as focus, the market as motivation and the policy as guarantee to promote the integration of rural and urban areas. This constructive process enabled the joint development of the urban and rural areas to remove the binary structure and to resolve the “three rural issues” (Zhao and Zhu 2009) [74].

3.6 Summary

The Metropolitan Chengdu is the economic, political and cultural center of Sichuan Province. With its location situating between the Tibetan Plateau and Chengdu Plain, the great terrain difference that is higher in the northwest and lower in the southeast makes the rivers in this area flowing from the northwest to the southeast and running through the Chengdu Plain, which is beneficial for the development of the agricultural development.

The naturally formed spider-web-like urban system and structure of Chengdu City has high similarity with the ideal urban structure concept of the “Garden City”. As a result, it is considered that Chengdu City has great natural advantages in becoming the World Garden City.

The rural cultural landscapes in Chengdu City can be further classified into rural landscapes in mountains, on alluvial plains and on low hills. Those rural cultural landscapes distributing among Chengdu Plain are alluvial plain type (Linpan) of rural landscape that takes rice farming as primary agricultural production.

During the progress of modernization, with the outflow of workforce from the rural villages, the hollowing of rural areas in Chengdu City is by far the most concerned issue. With the “three rural issues” gaining attention from the society, the government started to make holistic plans on the socioeconomic development of rural and urban

areas since 2000. The city of Chengdu takes the “three concentrations” (industries concentrate to development areas, farmers concentrate to towns, and lands concentrate to scale management) as focus, the market as motivation and the policy as guarantee to promote the integration of rural and urban areas.

Chapter 4

Characteristic and Transition of Rural Cultural Landscape on Alluvial Plain in Dujiangyan City

Chapter 4. Characteristic and Transition of Rural Cultural Landscape on Alluvial Plain in Dujiangyan City

4.1 Introduction

This chapter divides the socioeconomic development of the rural areas in Dujiangyan City into three phases—the Traditional Agrarian Era (before 1978), the Early Modernization Era (1978-2008) and the Mid-Modernization (Post-Earthquake) Era (after 2008). With this line of thinking, this chapter also gives further analysis on the characteristics and transitions of elements that construct the rural cultural landscape and lifestyles of the villagers in selected alluvial fan plain area of Dujiangyan

4.2 Alluvial Plain in Dujiangyan City

4.2.1 Dujiangyan Irrigation System

Figure 4-1 Dujiangyan Irrigation System (July, 2011)

The Dujiangyan irrigation system, which locates in the western portion of the Chengdu flatlands at the junction between the Sichuan basin and the Qinghai-Tibet plateau, is an ecological engineering feat originally constructed around 256 BC. Modified and enlarged during the Tang, Song, Yuan and Ming dynasties, it uses natural topographic and hydrological features to solve problems of diverting water for irrigation, draining sediment, flood control, and flow control without the use of dams. The system has produced comprehensive benefits in flood control, irrigation, water transport and general water consumption. It now irrigates 668,700 hectares of farmland. And finally, the Dujiangyan irrigation system has been designated as one of the World Heritage sites of China by UNESCO in 2000 (WHC 2013) [75].

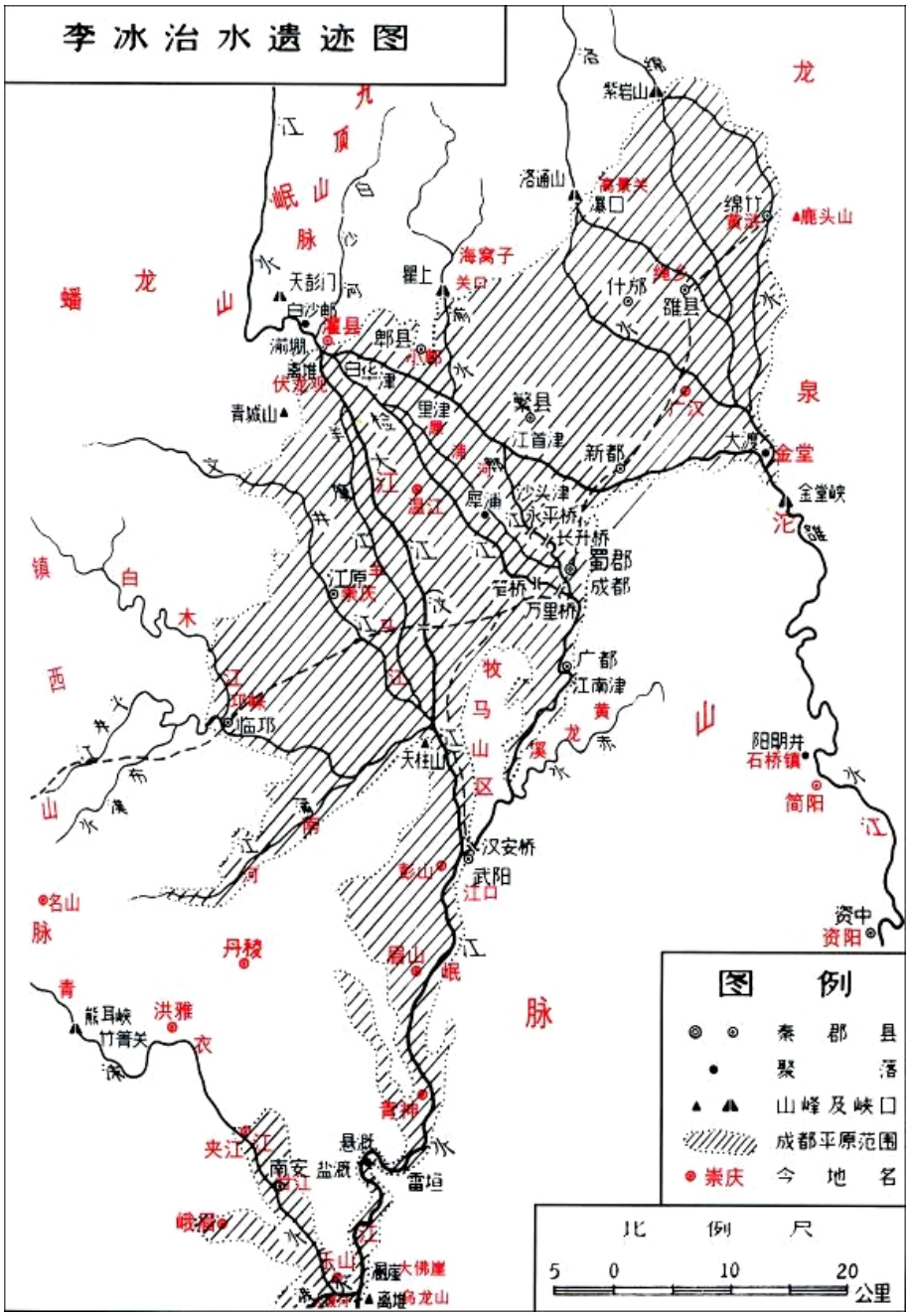


Figure 4-2 Watercourse System on Chengdu Plain[1]

According to the history, it is documented that the work of Lee Bing served to irrigate three counties and watered all paddy fields, hence making the lands in Sichuan area so fertile that this area was known as the “sea on land”. In drought, water were diverted from the irrigation system and in monsoon, water gates were closed to block the flood. As a result, people had it that drought and monsoon were now controllable at people’s will and hunger never known to man. No more years of famine and no more floods,

[1] Figure source: 常璩(晋)& 任乃強. (1987)

Sichuan is therefore the “Country of Heaven” (Chang 2010) [76].In other words, with Lee Bing’s work of the Dujiangyan Irrigation System that serves to water the Chengdu Plain (Chang 1987) [77] this area is then known as the Country of Heaven.

4.2.2 Dujiangyan City and the Alluvial Plain

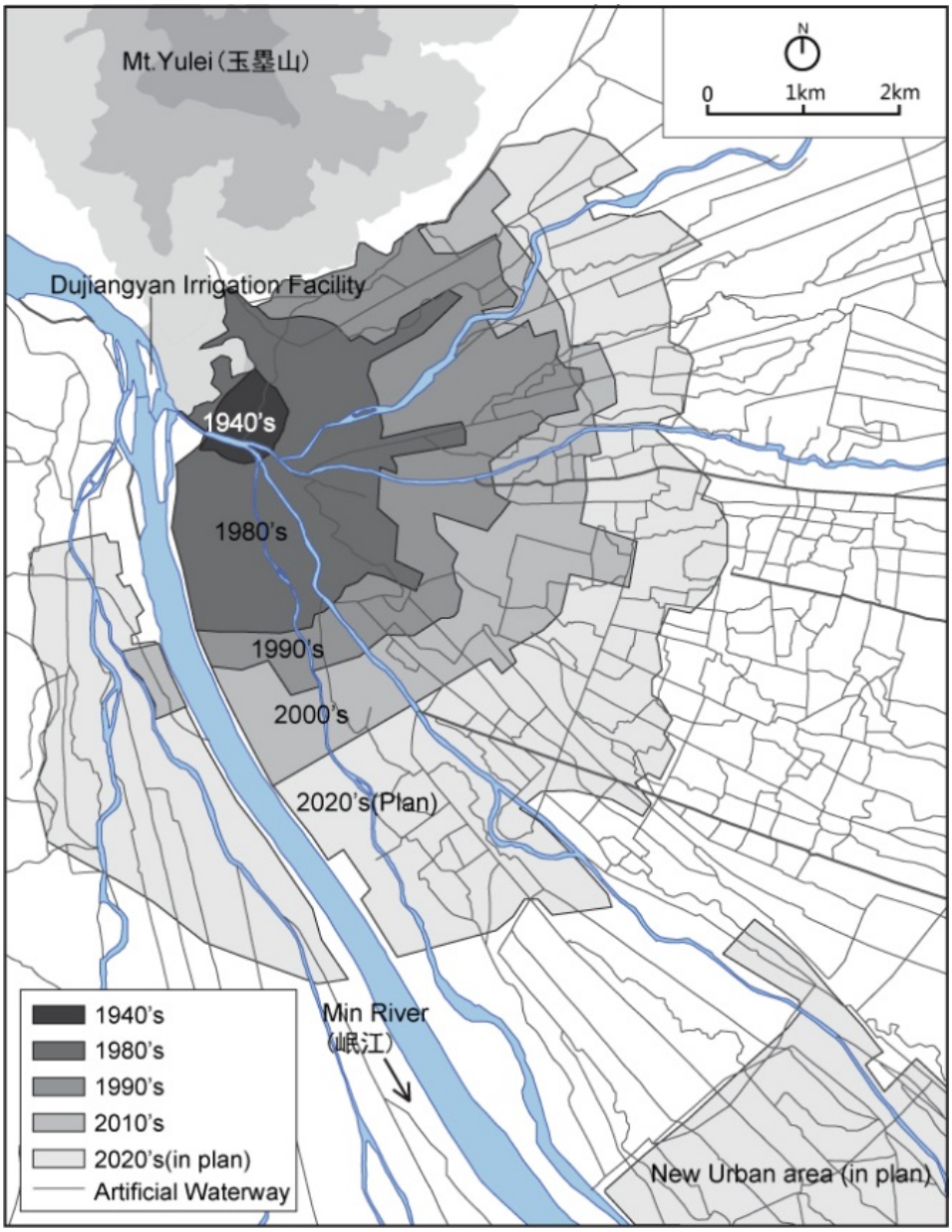


Figure 4-3 Urban Sprawl History of Dujiangyan City[1]

With a history of more than 2300 years, the city of Dujiangyan (East Longitude of 103°25'42"～103°47', North Latitude of 31°44'54"～31°02'09") (DJY 2013)[78] is

[1] Figure source: Shi, D. & Ishikawa, M. (2012)

known as “the city of historical and cultural significance” (NRCHC 2013) [79] situated in the northwest border of the Chengdu Plain. The city borders the Tibet Plateau with the soaring Longmen Mountains to the west and has the widespread Minjiang River alluvial fan in the east, where lies the central city blocks of Dujiangyan City and the surrounding rural areas. On the alluvial fan, the large-scaled Dujiangyan Irrigation System built in 256 BC still serves to be the foundation of agricultural development of this city with its mesh-like irrigation canals spread through lands.

As shown in Figure 4-6, the terrain in Dujiangyan can be distinguished into the mountain and plain areas due to the clear difference in elevation. From the lowest elevation of 560m above sea level in the southern plain to the highest elevation of 4800m in the northern mountains where the panda preserve zones located, the difference in elevation reaches 4240m. With this difference in elevation, the patterns and distribution of rural villages in this area and they can be divided into rural areas in mountain and rural areas on alluvial plain.

Table 4-1 Land Use Data in Dujiangyan City

Item	Length(km)	Area(km^2)
Administrative region of Dujiangyan city	-	1209.51
Mountainous area	-	796.84
Alluvial plain	-	412.67
Lake, reservoir	-	6.02
Natural river (Minjiang River)	252.56	17.23
Stream in mountainous area	208.75	-
Canals shaped by Dujiangyan dam	116.29	3.13
Urbanized area	-	37.38
Agricultural land in mountain area	-	132.20
Agricultural land on alluvial plain	-	375.29

From the land use statistics of Dujiangyan City in 2012 (Table 4-1), the area measurement of alluvial plain is 412.67km^2. Though its area only takes up 34% of the city, with its smooth terrain, the agriculture can be developed in this area and thus making the rural area in this place reaches 375.29km^2, which is 74% of all rural areas in Dujianhyan City. Whereas of the mountainous area (796.84km2) that takes up 66% of area of the city, lands that can be used for agricultural activities takes up only 26%

(132.20km2) of all farmlands in the city (Figure 4-4, Figure 4-5)， and most of which is dry lands that are with low productivity.This shows that the agricultural production in Dujiangyan City is highly dependent upon the yield of rural areas on alluvial plain.

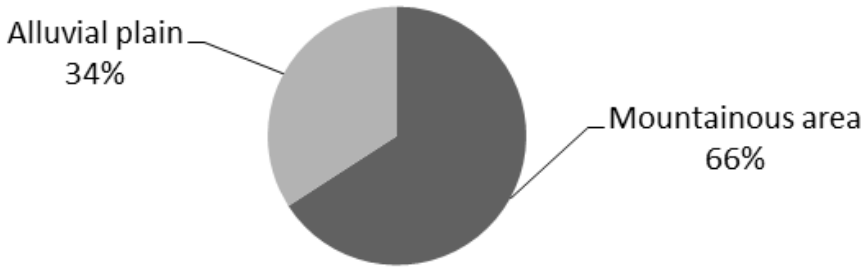


Figure 4-4 Share of Plain and Mountain Area

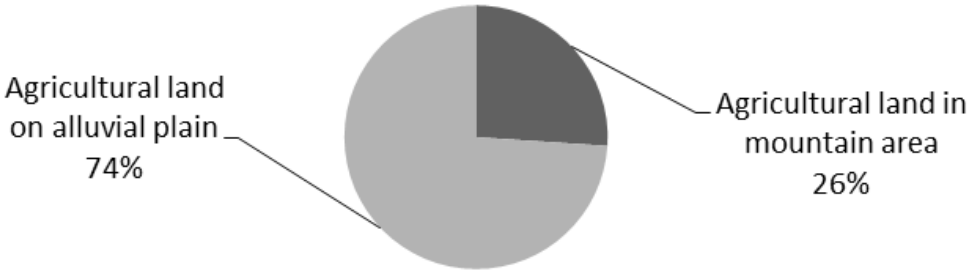


Figure 4-5 Share of Agricultural Land in Plain and Mountainous Area

The alluvial plain, however, is the place where this settlement pattern known as Linpan thrives. In the picture below, the elevation of alluvial plain where Linpans in Dujiangyan exist is between 600 to 800 meters from east to west. While concerning the slope inclination of the terrain of plain, most rural areas are in smooth places with slope inclination between 0-10 degrees.

Also, from the aspect of irrigation system, there are 5 artificial canals serve to irrigate this area in addition to Ming River. These artificial canals divert water from Ming River and spread through the alluvial plain in a divergent pattern with the Dujiangyan Irrigation System as the starting point.

While concerning the distribution of urbanized areas, the primary urban area (including the old towns) is located in the apex of irrigated zone and other traditional

rural areas are located along the water system and with equal distance in between. This phenomenon shows that under the agricultural technique limitation of agrarian era, the irrigation system is highly relevant to the human lives and production. It is also known that the rural areas covered by irrigation system have certain limitation on the population density.

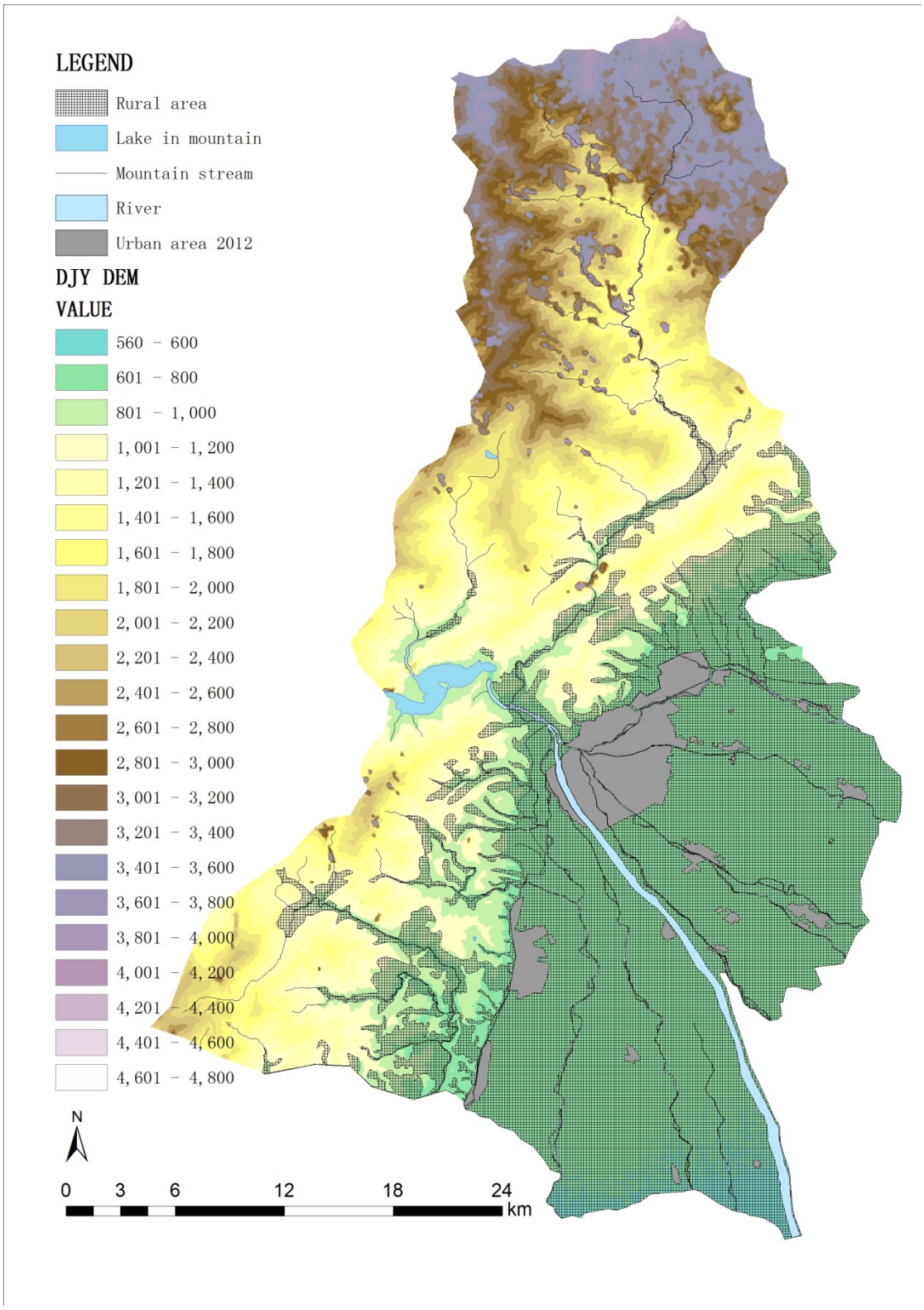


Figure 4-6 Topography and Land Use of Dujiangyan City[1]

[1] DEM data source: ASTER GDEM. Figure constructed by author.

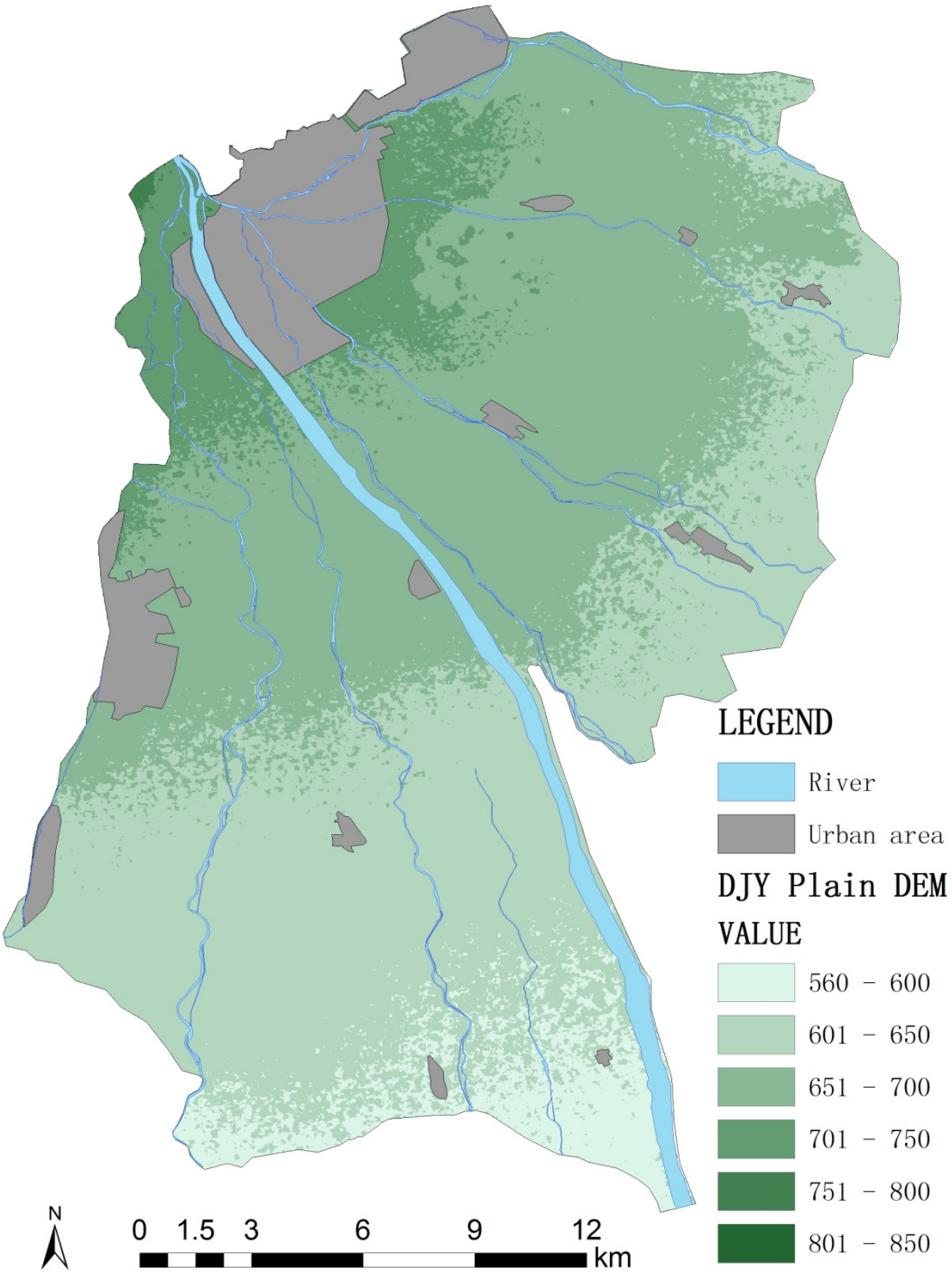


Figure 4-7 Topography of Alluvial Plain[1]

[1] DEM data source: ASTER GDEM. Figure constructed by author.

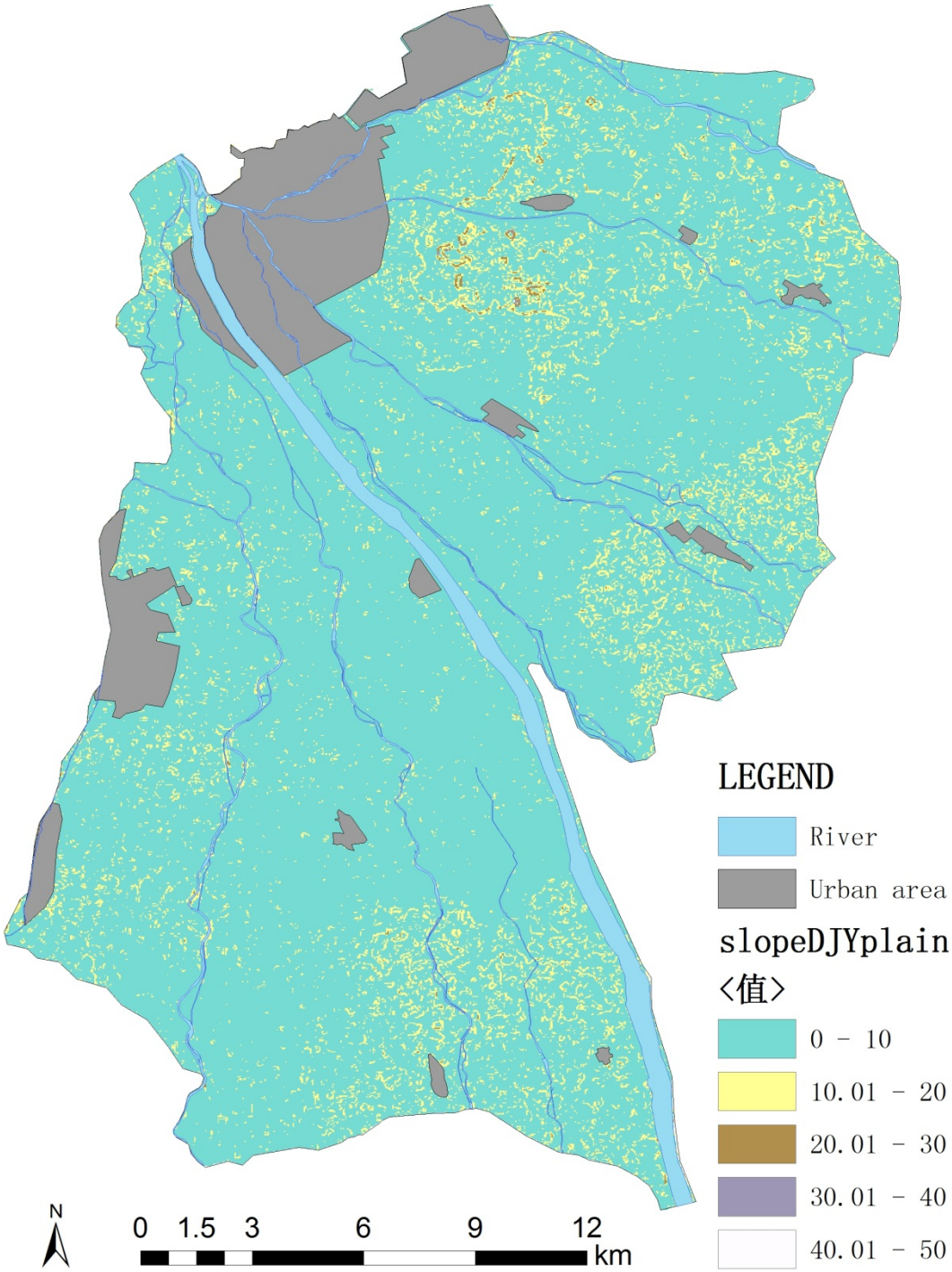


Figure 4-8 Slope Analysis Result of Alluvial Plain[1]

[1] DEM data source: ASTER GDEM. Figure constructed by author.

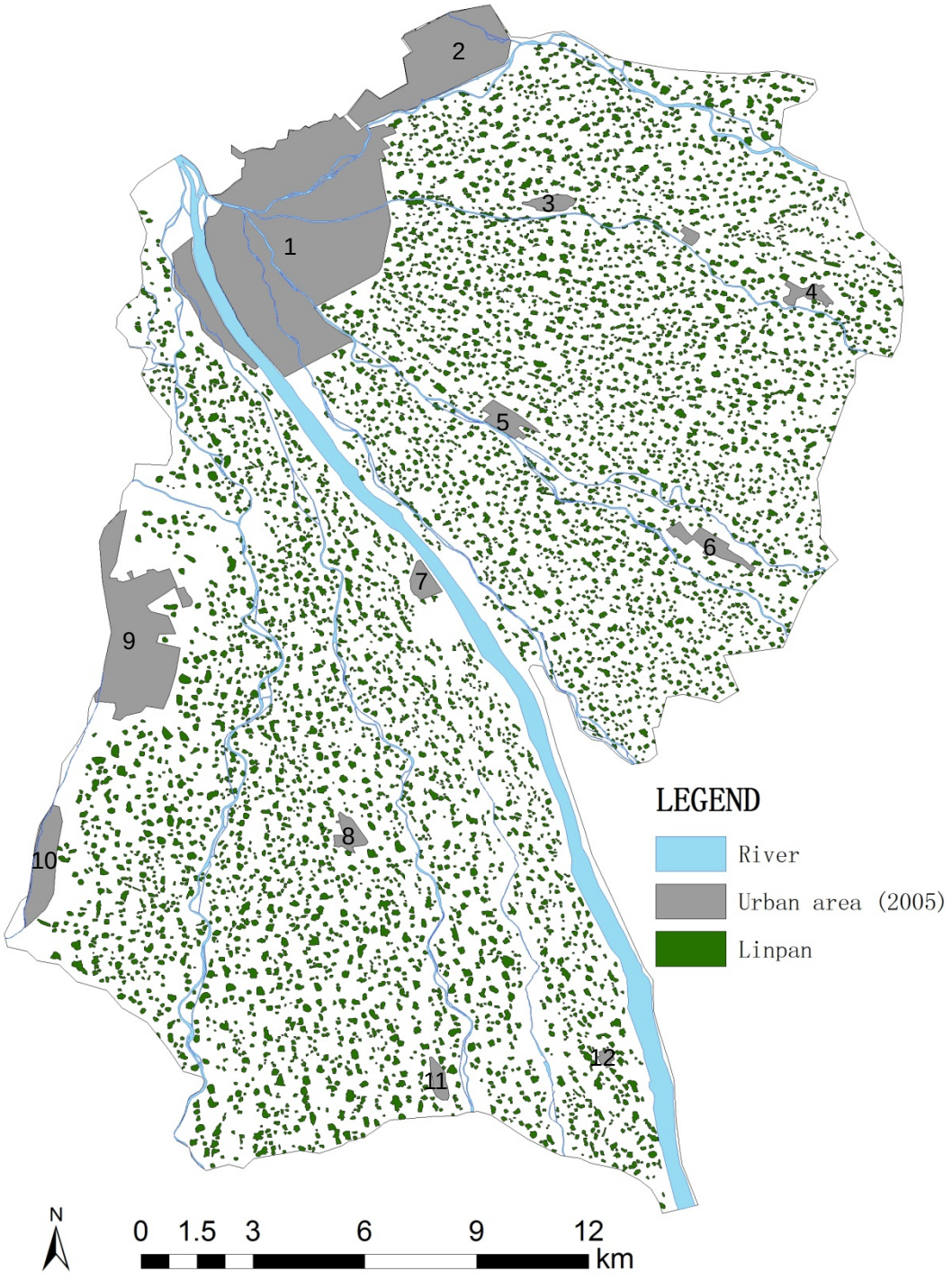


Figure 4-9 Rural Community in Alluvial Plain

Table 4-2 Area of Urbanized Area on Alluvial Plain (2005)

No.	Name	Area (km^2)
1	Main urban area of Dujiangyan	21.24
2	Puyang town	5.11
3	Xujia town	0.37
4	Tianma town	0.38
5	Juyuan town	0.60
6	Chongyi town	0.68
7	Cuiyuehu town	0.45
8	Shiyang town	0.44
9	Qingchengshan town	6.07
10	Daguan town	1.48
11	Liujie town	0.31
12	Yanjiang town	0.12

From the urban system of the alluvial plain, except for the primary downtowns, there are 11 other towns with smaller scale that are also included in Dujiangyan City（Figure 4-9，Table 4-2）. It is inferable from Figure 4-9 that except for the 1, 2, 9, and 10 spots urbanized areas that share boundary with mountains had expanded rapidly in their measurement (reaching 1km^2 and above) due to the industrialization and tourism development, other 8 towns in Linpan area did not expand in the measurement apparently (still under 1km^2). The average measurement of these 8 towns is 0.42km^2（Table 4-2）.

Table 4-3 Land Use Data of Alluvial Plain (2005)

Item	Length (km)	Area (km^2)
Alluvial Plain	-	412.67
Urbanized Area	-	37.38
Rural Area	-	358.28
Natural River (Minjiang River)	146.4	13.88
Canals shaped by Dujiangyan dam	116.29	3.13

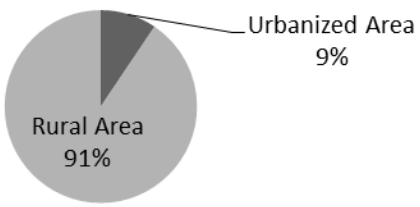


Figure 4-10 Share of Urbanized Area of Alluvial Plain (2005)

According to the GIS calculation in this study, by year 2005, the urbanized areas in alluvial plains reach 37.38km^2 and the rural areas are 358.28km^2. Hence in this line of thinking taking only land-use for calculation, the urbanization rate is 9% (Table 4-3,

Figure 4-10).

From the distribution of rural settlements on alluvial plain, it is confirmed that there are 6327 spots of settlements (Linpans). Also, with the property calculation via GIS data, the density of Linapn reaches 17.78 per km^2 and the total measurement is 5280,54ha, constituting 14.74% of the measurement of rural areas while the farmlands taking up 85.26%. It is also noticed that the average circumference of the Linpans is around 353m and the average area is 0.83ha（Table 4-4）.

Table 4-4 Scale of Linpan on Alluvial Plain

Item	Value
Linpan Number amount	6372
Linpan Number density	17.78(Linpan/Km^2)
Linpan Area amount	5280.54ha
Linpan Area ratio	14.74%
Agricultural Land ratio	85.26%
Average circumference of Linpan	353.21m
Average Area of Linpan	0.83ha

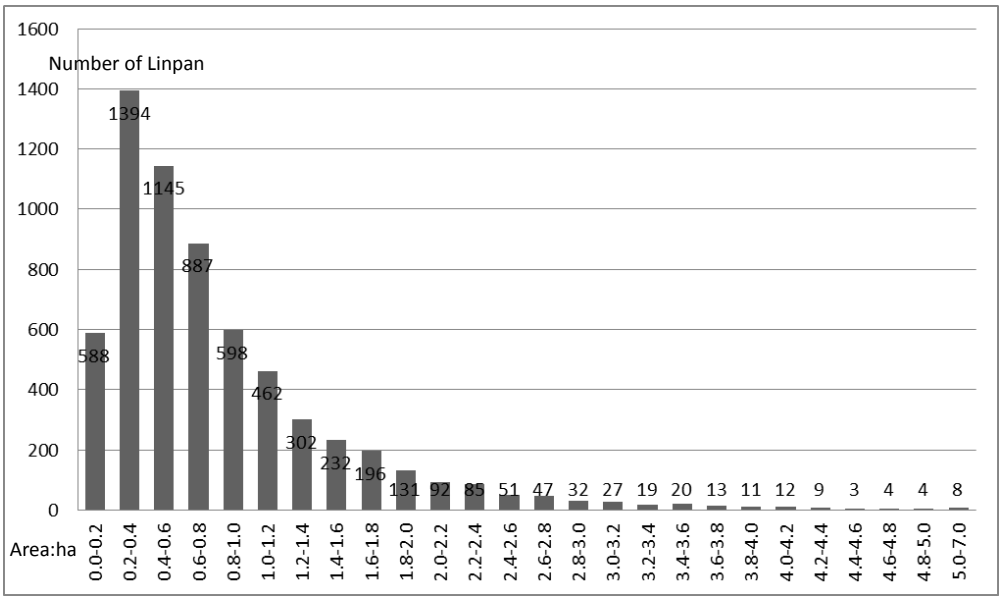


Figure 4-11 Classification of Linpan by Area Distribution (Alluvial Plain)

Concerning the Linpan measurement, among those Linpans on the alluvial plain, most of which are 0.2-0.4ha sized small Linpans, 1394 spots in total. The second most size is 0.4-0.6ha ones, reaching 1145 spots and 887 spots of 0.6-0.8ha Linpans. From the figure below, the quantity and measurement of Linpans are in inverse proportion after 0.2-0.4ha. The bigger the area measurement is, the fewer the respective quantity

distributes（Figure 4-11）.

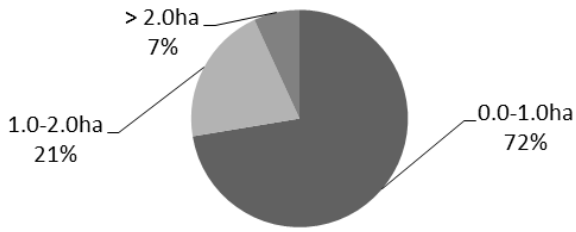


Figure 4-12 Share of Linpan Area Distribution (Alluvial Plain)

Based on the data in Figure 4-12, it is found that 72% of the Linpans are small ones with area measurement under 1.0ha and the second most Linpans are those with area between 1.0-1.2ha, taking up 21% of all. As for those large Linpans with their area measurement exceeds 2.0ha, the quantity is the least and takes up only 7% of all (Figure 4-12).

4.2.3 Focused Site and Three Eras in Development

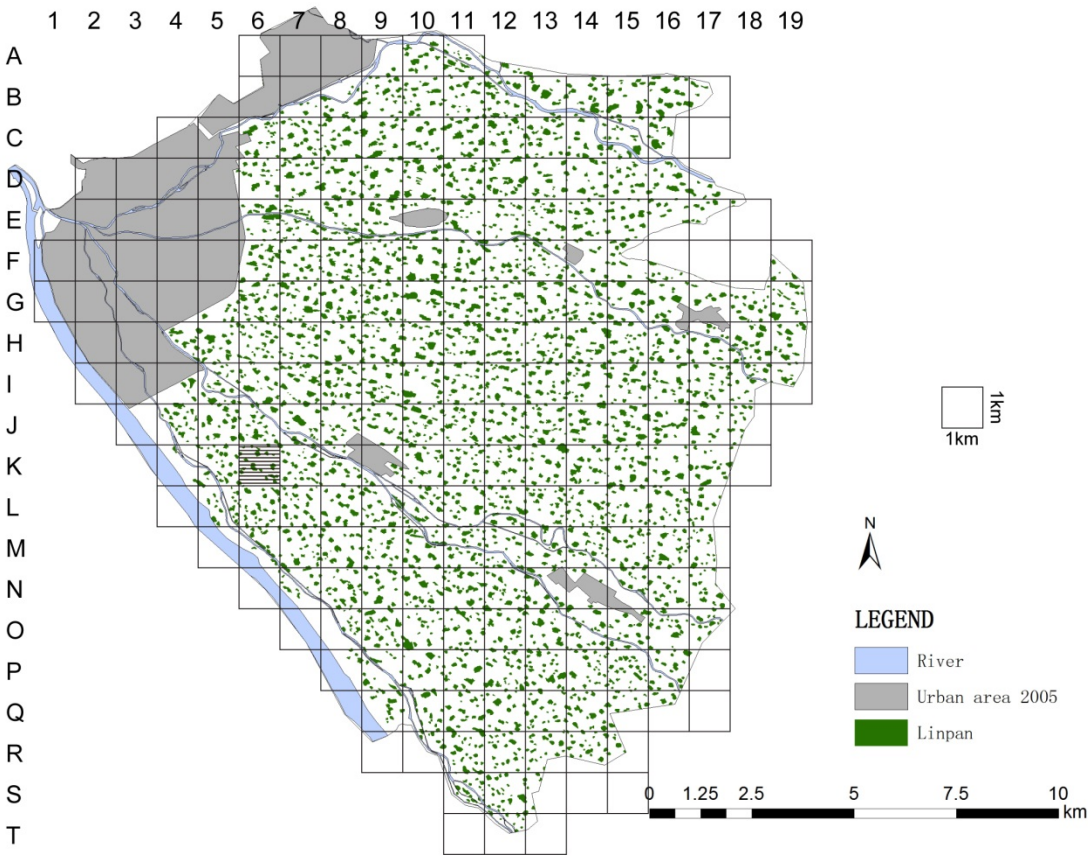


Figure 4-13 Focused Area with 1km×1km Mesh for Detailed Analysis

Technically, as shown in Figure 1-8 in Chapter 1, in current conditions this study can only have access to the satellite images of Dujiangyan plain areas from Google Earth in July 22, 2005 and May 17, 2012. Also, the 2012 satellite image covers only the fan-shaped area shown in Figure 4-13 The irrigation system diverged from the World Heritage Dujiangyan Irrigation System passes through this fan-shaped area; hence this area is directly related to the Dujiangyan Irrigation System. With these reasons, this study therefore takes the fan-shaped area as the focus for the further analysis on land-use as well as the landscape elements transitions.

The area measurement of this region is 197.80km^2 and the urbanized and rural area in this region is 25.98km^2 and 163.41km^2 respectively. The Ming River that runs through this area is 20.83km in length (surface area 5.28km^2) and the main irrigation canal length is 116.29km (surface area 3.13km^2) (Table 4-5).

Table 4-5 Land Use Data of Fan-Shape Area (2005)

Item	Length (km)	Area (km^2)
Fan-shape Area	-	197.80
Urbanized Area	-	25.98
Rural Area	-	163.41
Natural River (Minjiang River)	20.83	5.28
Canals shaped by Dujiangyan dam	116.29	3.13

Concerning the economic and social development of the Dujiangyan rural areas (especially the alluvial plains of the research focus in this study), though China has moved toward modernization in all aspects since the era of the Republic of China, which is after Qing Dynasty in early 20th century, the development were confined to major cities and the vast rural areas still remained traditional small-scaled economic development patterns. With the People's Republic of China being established in 1949, rural areas in China had went through land reform and followed by several political movements including the Great Leap Forward and the Cultural Revolution. The economic and social development of the rural areas was thus postponed. Ever since the Chinese Economic Reform in 1978, especially after 1980s, the surplus workforce in the rural areas started moving to cities, the urbanization and industrialization were thus in fast development and marked the initialization of large-scale modernization of the vast rural areas in China. Hence in this study, the year of 1978 is regarded as the point of transition from traditional agrarian societies to the Early Modernization Era of the rural areas in Dujiangyan. Years after, as the mega earthquake stroke Sichuan in

2008 and brought a great deal of damage, the post-earthquake reconstruction works motivated the New Village Construction Movement and brought forward significant changes to the infrastructures and landscapes of the rural areas. It was also noticed that this government-guided changes tended to last long. This study therefore regards 2008 as the first year of the focused rural areas proceeding to Mid-Modernization Era.

In sum, the economic and social development of the rural areas in Dujiangyan can be classified into three phases. Phase one will be the era before 1978, which can be referred to as traditional agrarian era or pre-modern era. While phase two will be the time frame between 1978 and 2008, which is known as the Early Modernization Era and the phase three being the Mid-Modernization Era after 2008. The following discussion will base on the three time frames for detailed elaboration on the characteristics and transitions of each element on the rural cultural landscape in alluvial plain in Dujiangyan City

In addition, for the convenience in referring to the objects, the fan-shaped area is divided into 1km×1km grids with 1-19 in horizontal axis and A-T in vertical axis (Figure 4-13). In the text, “vertical axis letter •Horizontal axis number” will be used to refer to certain $1km^2$ grid. As in the below, the analysis is concerning the K • 6 grid.

4.3 Traditional Agrarian Era (before 1978)

4.3.1 Urban-Rural Relationship

Following discussion will elaborate in detail concerning the rural settlements (Linpans), farmlands, water system and the road system of this area with a particular focus on the characteristics of traditional cultural landscapes before 1980 and further analyze the relation between these characteristics and the traditional agrarian culture.

As shown below, a 1×1km graph of the study area is cropped for specific cultural and landscape analysis.

For better elaboration on the characteristics on the landscape and structure of alluvial plain, the author selected the sector area connected directly to the ancient Dujiangyan Irrigation System as the study area. This area is also where the special rural settlement pattern known as Linpan best developed.

4.3.2 Rural Community

4.3.2.1 Area and Distribution of Linpans

In GIS calculation, there are 3368 Linpans on the fan-shaped area in traditional agrarian era and the measurements of these Linpans are mostly between 0.2-0.4ha, reaching 743 spots. The second most are those with measurement between 0.4-0.4ha, reaching 678 spots and those between 0.6-0.8ha are 501 spots (Figure 4-14). Although the measurement of this fan-shaped area takes up only half of the alluvial plain, the distribution characteristics of Linpans is identical to the characteristics shown in Figure 4-11 the inverse proportional relation of the quantity and measurement of Linpans after 0.2-0.4ha in horizontal axis. Also, what is similar with Figure 4-12 is that small-sized Linpans with measurement under 1.0ha take up most of the quantity of Linapnas at 77%. The second most size is between 1.0-1.2ha at 19% and the least are those exceed 2.0ha, 4% (Figure 4-15).

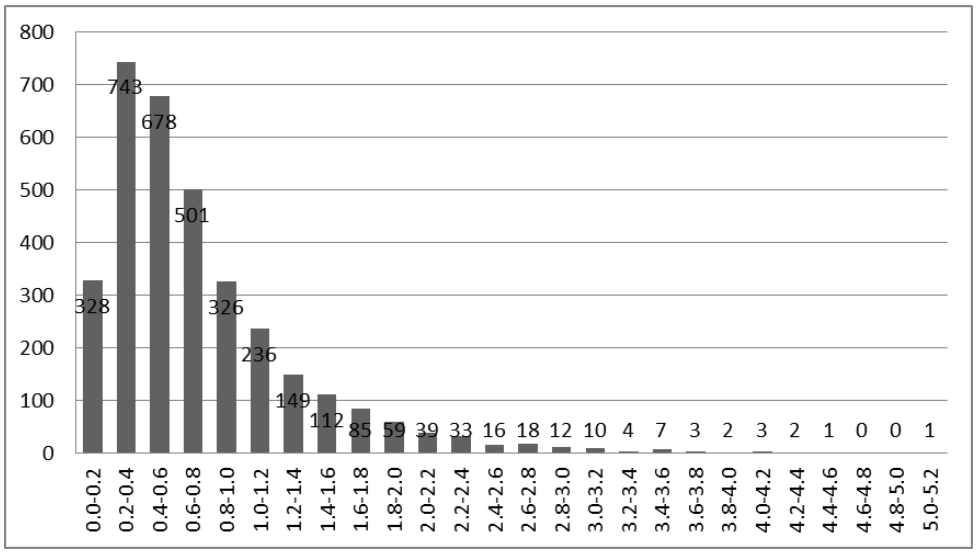


Figure 4-14 Classification of Linpan by Area Distribution (Fan-shape Area)

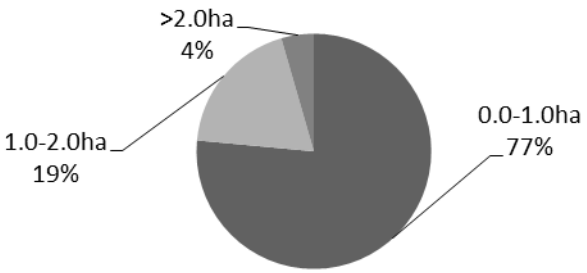


Figure 4-15 Share of Linpan Area Distribution (Fan-shape Area)

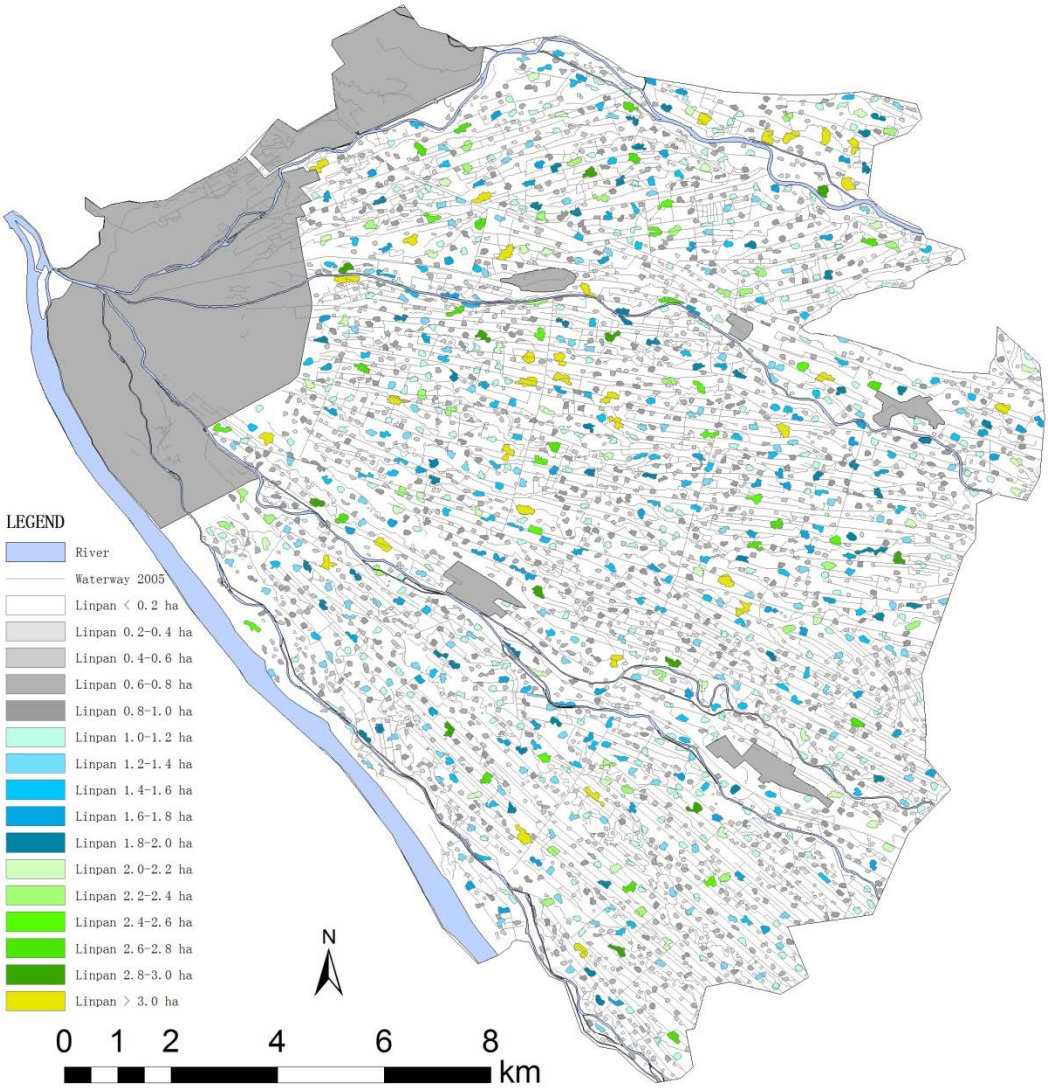


Figure 4-16 Classification of Linpan According to Area Measurement

In addition, according to the GIS calculation, the total area measurement of those 3368 Linpans on fan-shaped are is 2518.72ha, taking up 15.42% of the rural area measurement and 84.58% of the farmland areas. The average area of Linpan is at 0.75ha and average circumference is 343.15m. On average, there are 20.61 spots of Linpan per km^2 (Table 4-6).These statistics are very close to the digits shown in Table 4-4.

This phenomenon shows that Linpans at different sizes are distributed evenly on the alluvial plain; hence the analysis on the characteristics of Linpans in the fan-shaped area is general and representative.

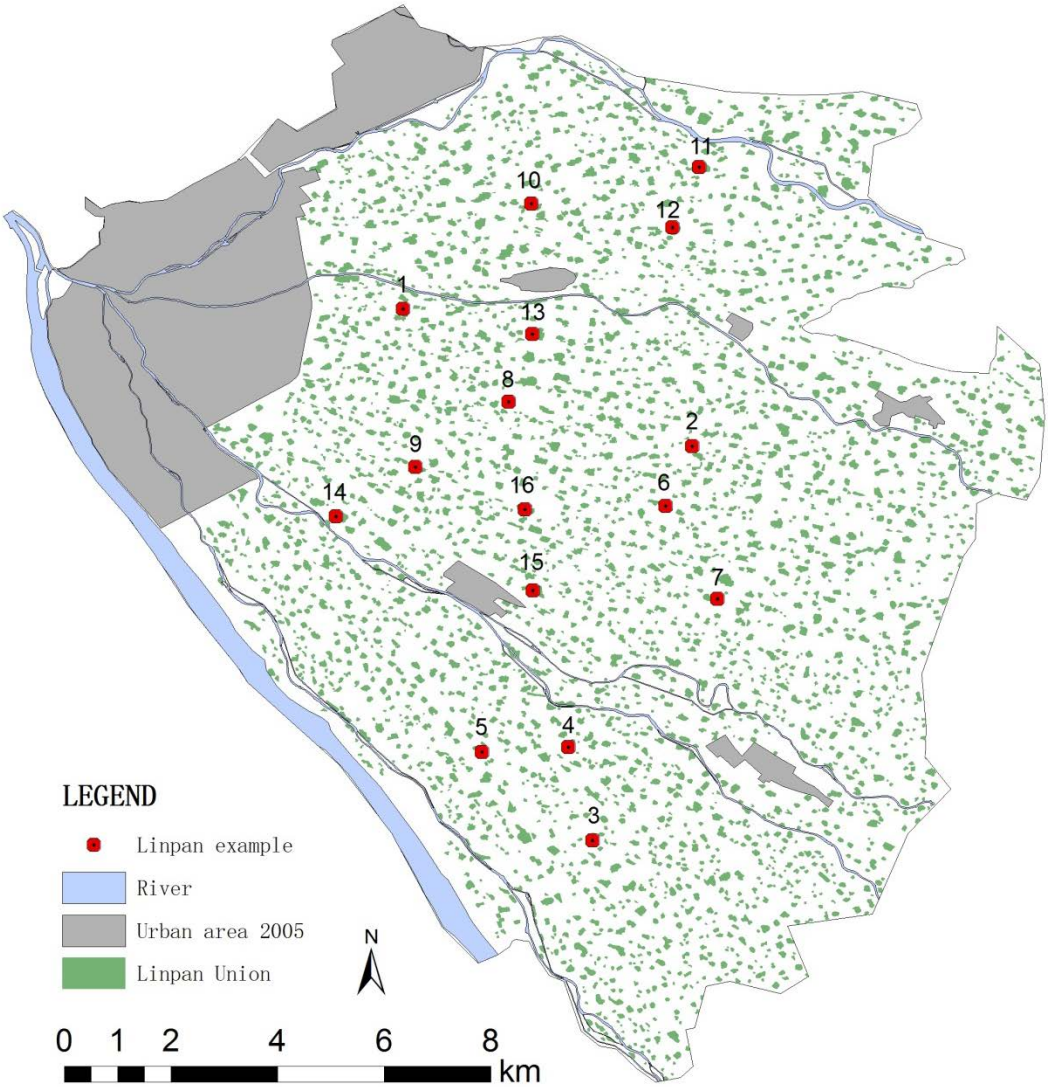


Figure 4-17 Sites of 16 Linpan for Example

From the distribution of Linpan at different size in the fan-shape area (Figure 4-16), the sizes of these Linpans can be divided into four categories including those smaller than 1.0ha, 1.0-2.0ha, 2.0-3.0ha and larger than 3.0ha. For a more direct observation of the sizes of Linpan, this study selected 16 Linpans as examples (Figure 4-17), and prepared Linpan layout as in Figure 4-18, Figure 4-19, Figure 4-20, Figure 4-21.

1 0.0-0.2ha

Linpan Number Amount: 328

Linpan Example: No.1
Circumference: 142.76m
Area: 0.15ha

2 0.2-0.4ha

Linpan Number Amount: 743

Linpan Example: No.2
Circumference: 228.87m
Area: 0.33ha

3 0.4-0.6ha

Linpan Number Amount: 678

Linpan Example: No.3
Circumference: 264.32m
Area: 0.48ha

4 0.6-0.8ha

Linpan Number Amount: 501

Linpan Example: No.4
Circumference: 349.88m
Area: 0.73ha

5 0.8-1.0ha

Linpan Number Amount: 326

Linpan Example: No.5
Circumference: 367.92m
Area: 0.96ha

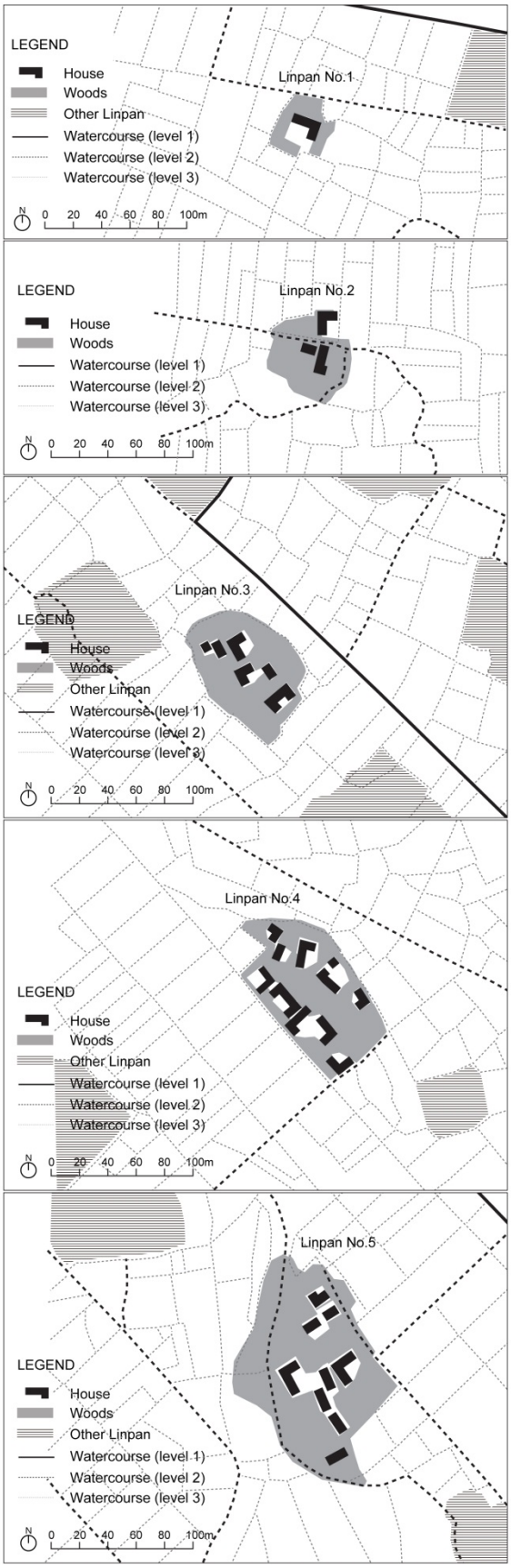
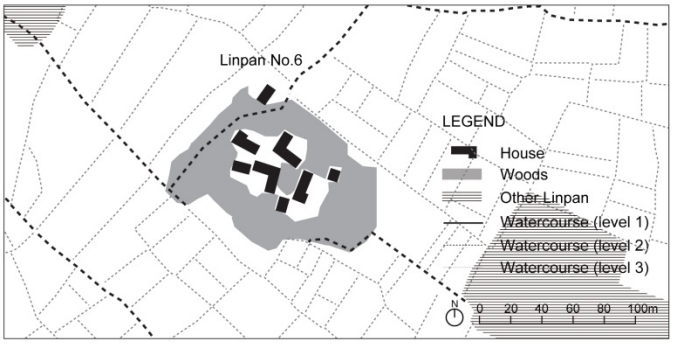


Figure 4-18 Linpan Example (0-1.0ha)

6 1.0-1.2ha

Linpan Number Amount: 236

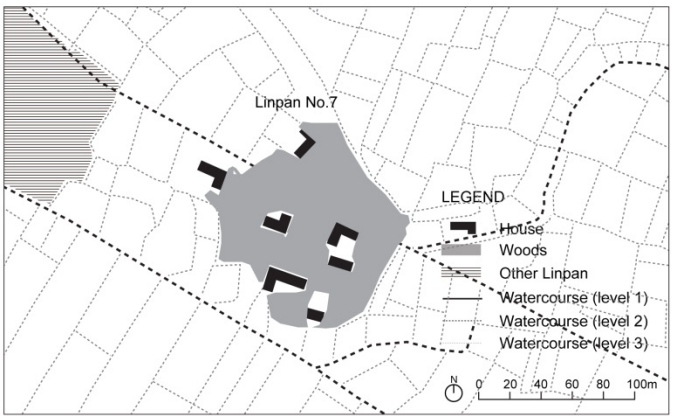
Linpan Example: No.6
Circumference: 423.31m
Area: 1.09ha



7 1.2-1.4ha

Linpan Number Amount: 149

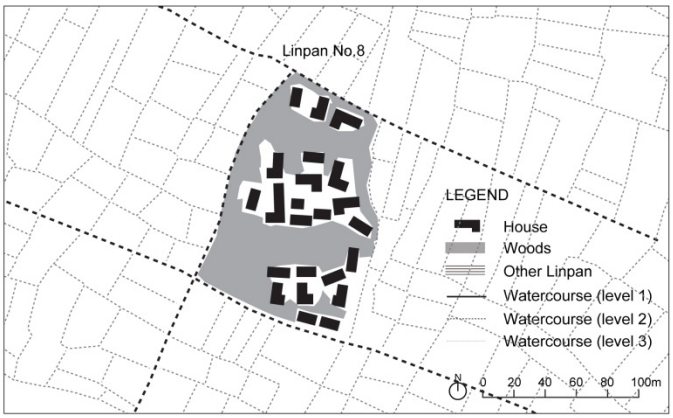
Linpan Example: No.7
Circumference: 505.82m
Area: 1.31ha



8 1.4-1.6ha

Linpan Number Amount: 112

Linpan Example: No.8
Circumference: 462.33m
Area: 1.41ha



9 1.6-1.8ha

Linpan Number Amount: 85

Linpan Example: No.9
Circumference: 563.74m
Area: 1.60ha

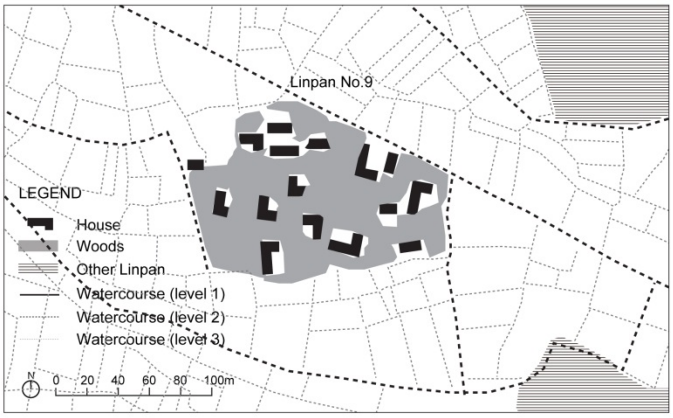
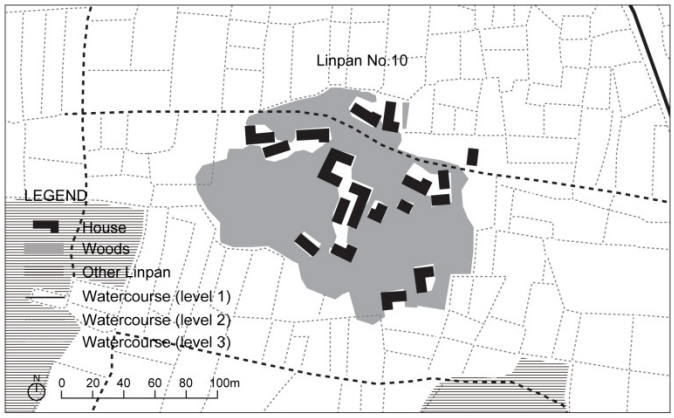


Figure 4-19 Linpan Example (1.0-1.8ha)

10 1.8-2.0ha

Linpan Number Amount: 59

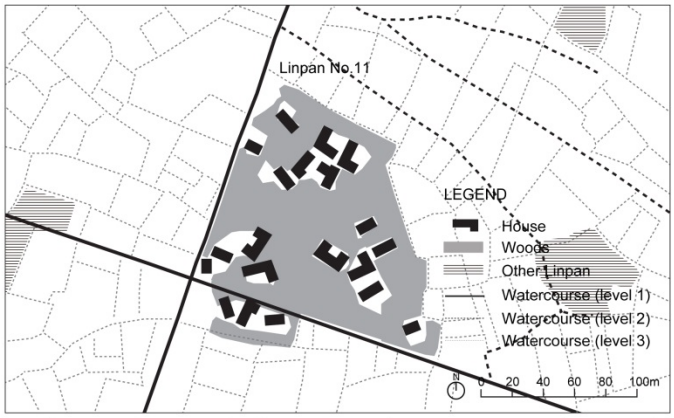
Linpan Example: No.10
Circumference: 635.42m
Area: 1.96ha



11 2.0-2.2ha

Linpan Number Amount: 39

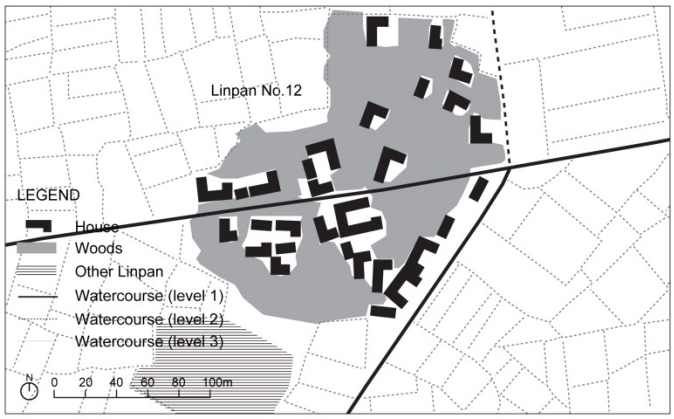
Linpan Example: No.11
Circumference: 532.72m
Area: 2.06ha



12 2.2-2.4ha

Linpan Number Amount: 33

Linpan Example: No.12
Circumference: 631.67m
Area: 2.37ha



13 2.4-2.6ha

Linpan Number Amount: 16

Linpan Example: No.13
Circumference: 731.38m
Area: 2.56ha

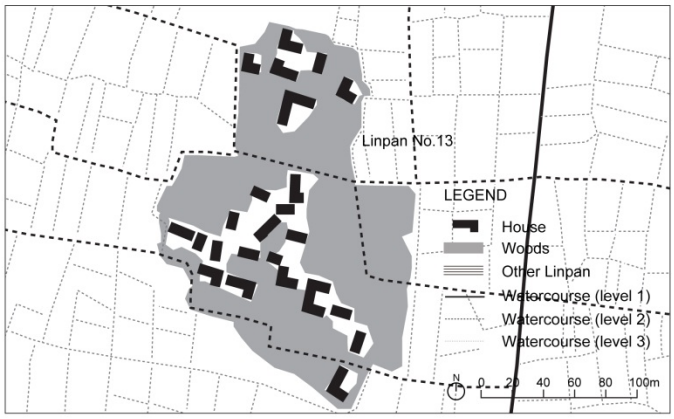
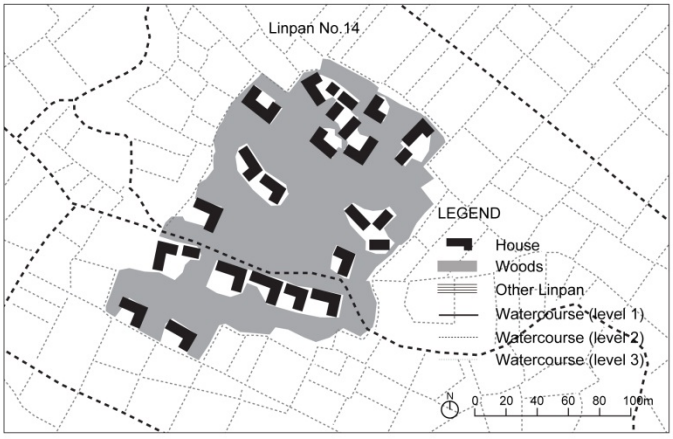


Figure 4-20 Linpan Example (1.8-2.6ha)

14 2.6-2.8ha

Linpan Number Amount: 18

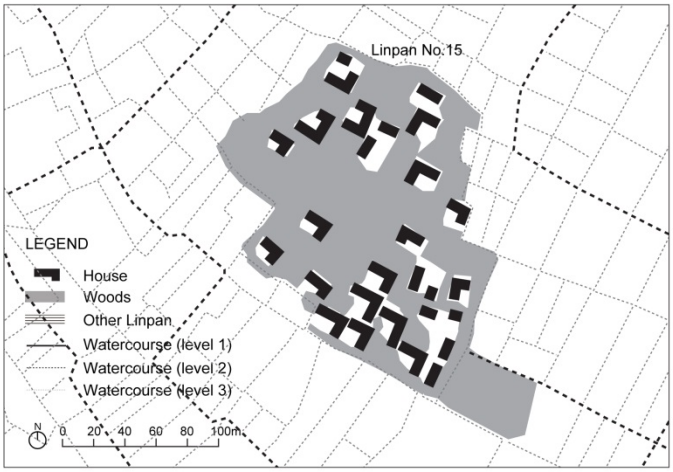
Linpan Example: No.14
Circumference: 730.11m
Area: 2.67ha



15 2.8-3.0ha

Linpan Number Amount: 12

Linpan Example: No.15
Circumference: 768.62m
Area: 2.85ha



16 >3.0ha

Linpan Number Amount: 33

Linpan Example: No.16
Circumference: 737.82m
Area: 3.88ha

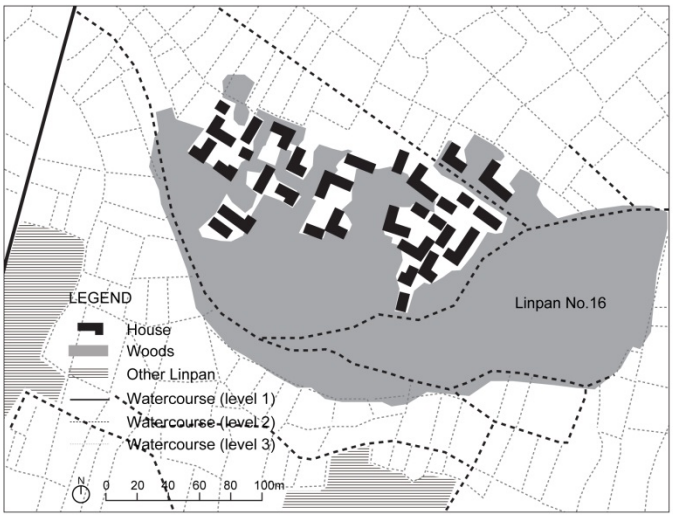


Figure 4-21 Linpan Example (2.6-3.0ha and >3.0ha)

Table 4-6 Scale of Linpan on Fan-shape Area

Item	Value
Linpan Number amount	3368
Linpan Number density	20.61(Linpan/Km^2)
Linpan Area amount	2518.72ha
Linpan Area ratio	15.42%
Agricultural Land ratio	84.58%
Average circumference of Linpan	343.15m
Average Area of Linpan	0.75ha

Further, concerning the spacing (form the center of one Linpan to that of another) between Linapns, this study takes 50m as one unit and divides 7 different sectors within 0-350m. With the result based on GIS calculation as in Figure 4-22, most spacing is between 200-250m.

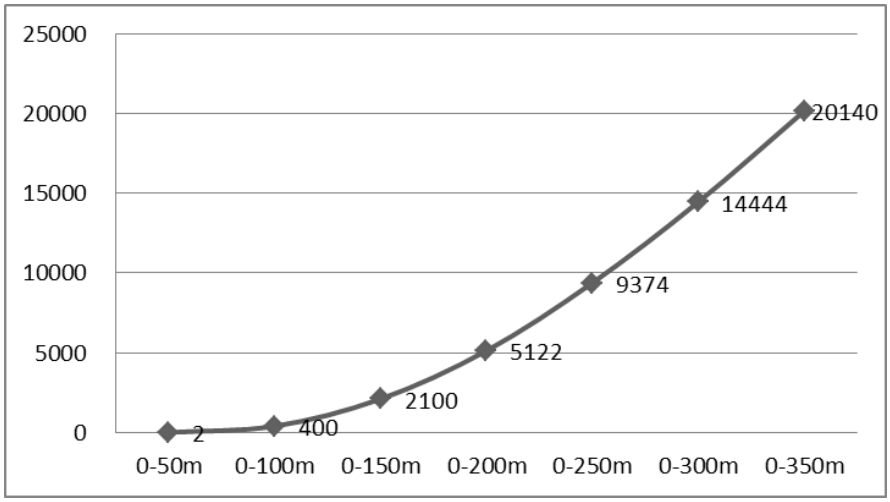


Figure 4-22 Analysis of Distance between Linpan (Fan-shape Area)

In the following discussion, the rural area covered within K・6 grid (Figure 4-23) will be used as an example for the analysis on the characteristics of land-use and landscape elements in Linpan areas.

There are 25 Linpans in this grid of 1km^2. As shown in Table 4-7, detailed information are provided. Based on this information, the average circumference of these Linpans is 312.46m and average area measurement is 0.66ha. On average, there are 6 households in each Linpan and the house foundation measurement is 0.22ha and the building density (total area of house foundation/Linpan area) is 35.27% (Table 4-8).

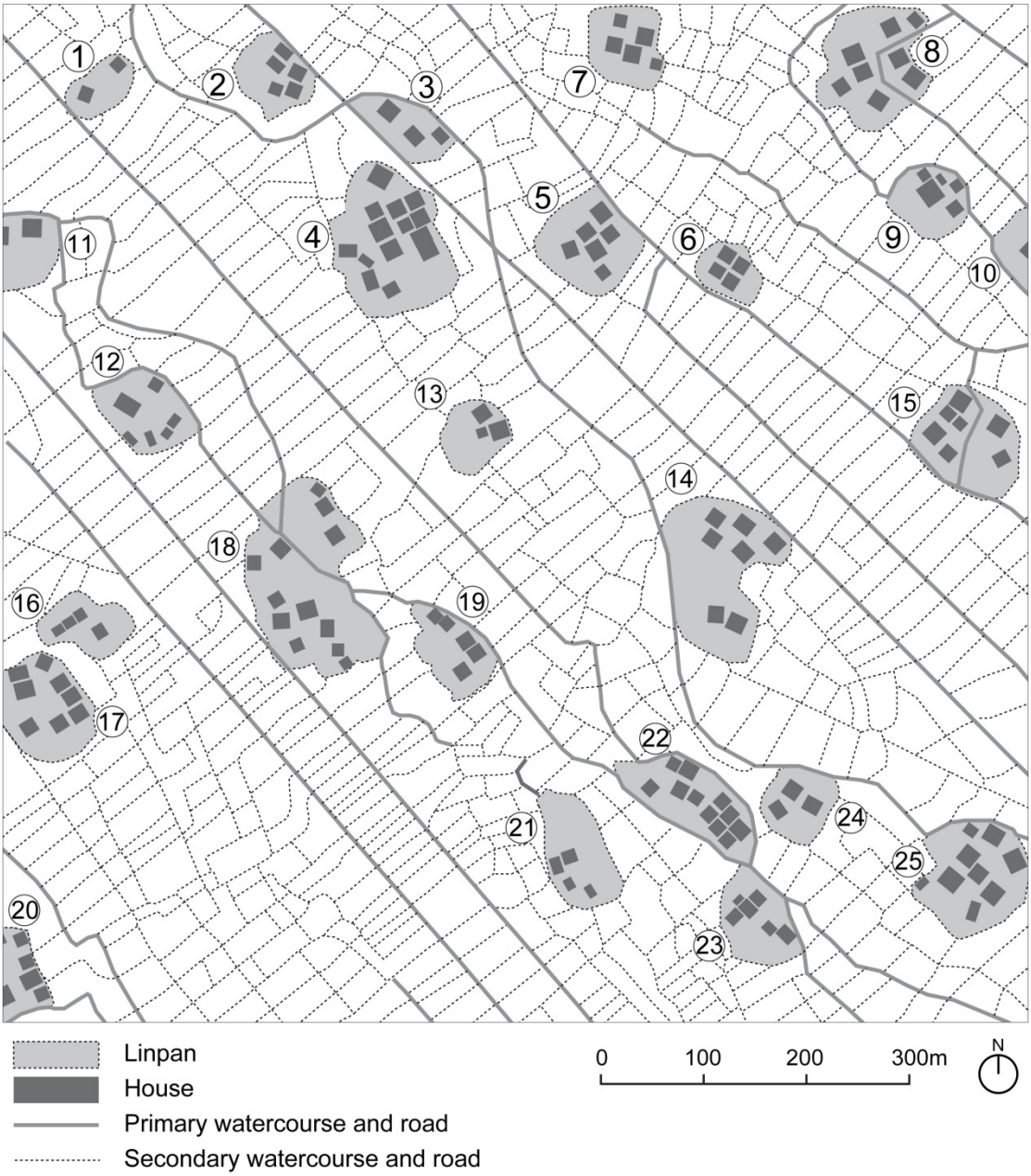


Figure 4-23 Layout Plan of Mesh K • 6 (before 1978)

Table 4-7 Value of 25 Linpan

Linpan No.	Linpan Perimeter(m)	Linpan Area(ha)	Household number	Building area(ha)	Building coverage ratio(%)
1	202.72	0.27	2	0.05	17.64
2	227.97	0.33	5	0.17	50.80
3	226.03	0.28	3	0.11	39.17
4	468.83	1.24	13	0.48	38.50
5	302.24	0.63	6	0.22	35.17
6	197.27	0.26	4	0.15	56.82
7	306.65	0.57	5	0.18	32.07
8	343.14	0.93	8	0.29	31.71
9	238.10	0.41	5	0.18	45.07
10	280.95	0.50	4	0.15	29.28
11	286.62	0.50	2	0.07	14.62
12	281.74	0.54	6	0.22	41.18
13	199.28	0.26	3	0.11	42.29
14	503.45	1.39	7	0.26	18.60
15	341.07	0.79	7	0.26	32.59
16	295.06	0.45	4	0.15	32.94
17	319.52	0.73	8	0.29	40.21
18	599.55	1.89	12	0.44	23.37
19	255.00	0.43	5	0.18	42.71
20	368.00	0.93	9	0.33	35.62
21	297.78	0.55	4	0.15	26.75
22	380.02	0.84	11	0.40	48.40
23	276.34	0.51	6	0.22	43.44
24	190.01	0.42	3	0.11	26.40
25	424.17	0.91	9	0.33	36.41

Table 4-8 Average Value of 25 Linpan

Linpan Perimeter(m)	Linpan Area(ha)	Household number	Building area(ha)	Building coverage ratio(%)
312.46	0.66	6.04	0.22	35.27

On account of the small-scaled labor intensive works of agricultural production without the assistance of large machines in the traditional agrarian era, the distance from Linpans to farmlands is determined by the walkability of the villagers. If the distance to the farmlands reaches certain length, the agricultural production will be influenced and thus the villagers will consider establishing a new farmhouse in their farmlands, hence the new Linpan.

Since Linpans are composed of individual farmhouses, the size of each Linpan is in direct proportion to the household amount. However, for most traditional Linpans, the households are usually under 20.

In this line of thinking, the walkable distance of the villagers in the agrarian era makes it impossible for the farmhouses to gather without limitation and thus impossible for the Linpans to expand unlimitedly. In general, the distribution displays their characteristics of being scattered evenly.

4.3.2.2 Architectural Arrangement and Consanguinity in Linpans

Figure 4-24 House-Building Year in Linpan No.4, No.5

From the formation of Linpans, with the long influence of patrilineage traditions of the Han people, this patrilineal lineage also reflects on the plane arrangement of the households in Linpans. Usually as a family is settled, the male descendants will move out to establish new households when married. The location of the new household built is usually on the farmland that is near their family house and thus form an arrangement of gathered Linpan that expands from the family house. As a result, the arrangement of buildings within a Linpan fully reflects the consanguineous relation of the villagers.

As shown in Figure 4-24, houses built before 1920 can be found in Linpans and the houses surrounding them are mostly built between 1920 and 1980. Also, for the convenience of communication, cooperation and security among neighbors, the distance between houses in Linpans are relatively closer and this high density of buildings in a sense offers more spaces for the forests and farmlands to produce more agricultural products.

In addition, it is also noticed that the austere belief on the veneration of ancestors is more flourished than the traditional religious belief that is already elite-centered and based on Confucianism, Taoism and Buddhism. Hence in traditional society, the life event of birth, aging, sickness and death all take place within Linpans and the vicissitude of the population of a family is thus fully reflected on the spatial arrangement of buildings in Linpans.

Exactly because of the basic unit constructing the Linpan is the patriarchal clan, as mentioned above, intangible relations as family unit exist in Linpan. Take Linpan No. 1, 2, and 3 as examples. Basically every Linpan will have more than one family unit (Figure 4-25). Under the traditional agrarian society lifestyle, the fundamental elements that are included in every family unit are cottage facing the watercourse (roads) with courtyard[1], forest surrounding this cottage that is consisting of arbors, bushes, bamboos and fruit trees, the vegetable gardens and livestock-keeping spaces under the forest, cemetery of the ancestors, and also tiny watercourses running through the lands that serve to irrigate trees, vegetables and to provide water sources for the livestock. In other words, every family unit is the smallest landscape unit that constitute the Linpan structure (Figure 4-26).

[1] According to satellite pictures that show the direction of houses and the result of the field survey, the houses in Linpan face in different directions but are vertical to the watercourses (roads). This is a distinctive difference from other houses in other parts of China where the Han people lives because they tend to have their houses situated in north facing south.

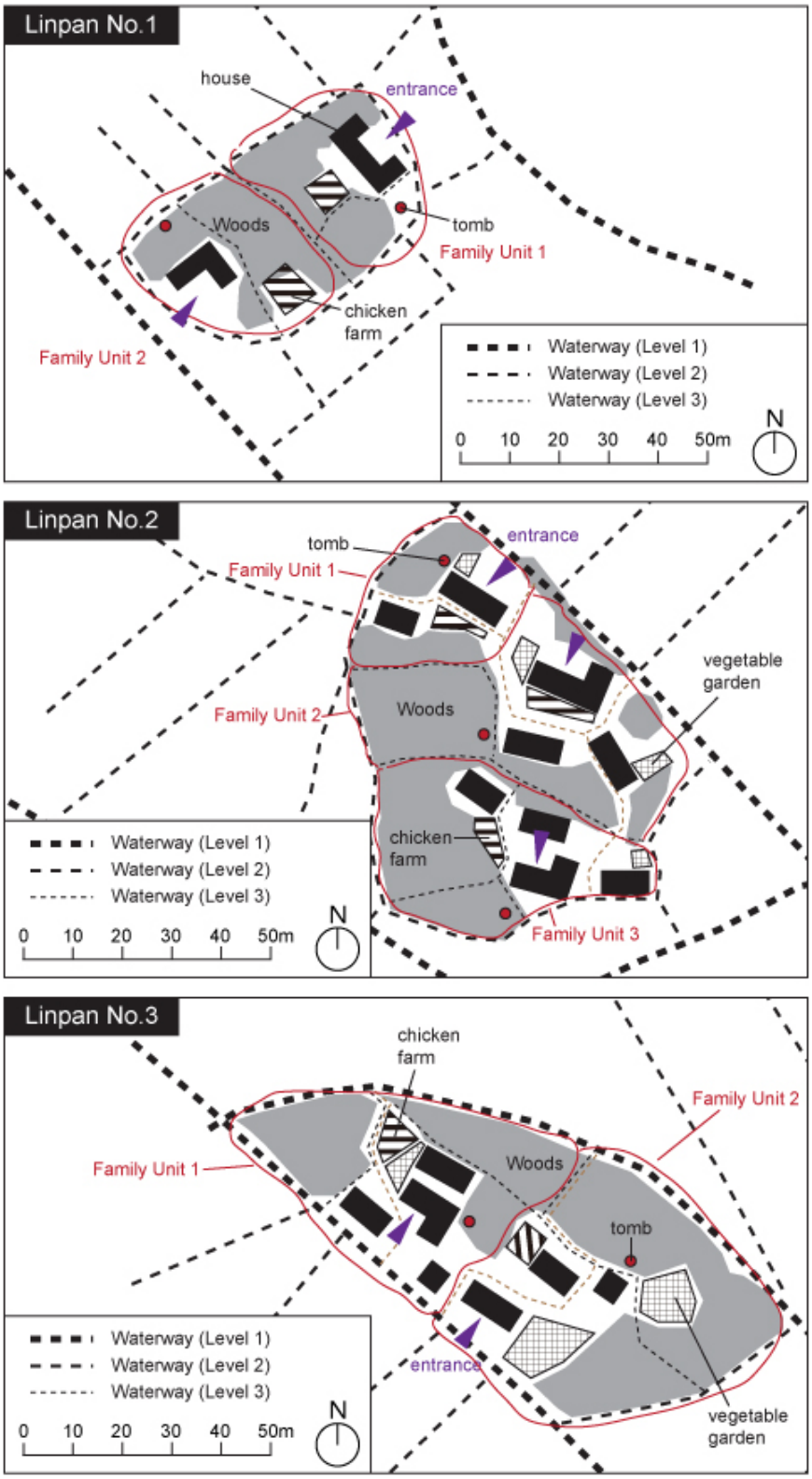


Figure 4-25 Structure of Linpan (Linpan No.1,2,3)

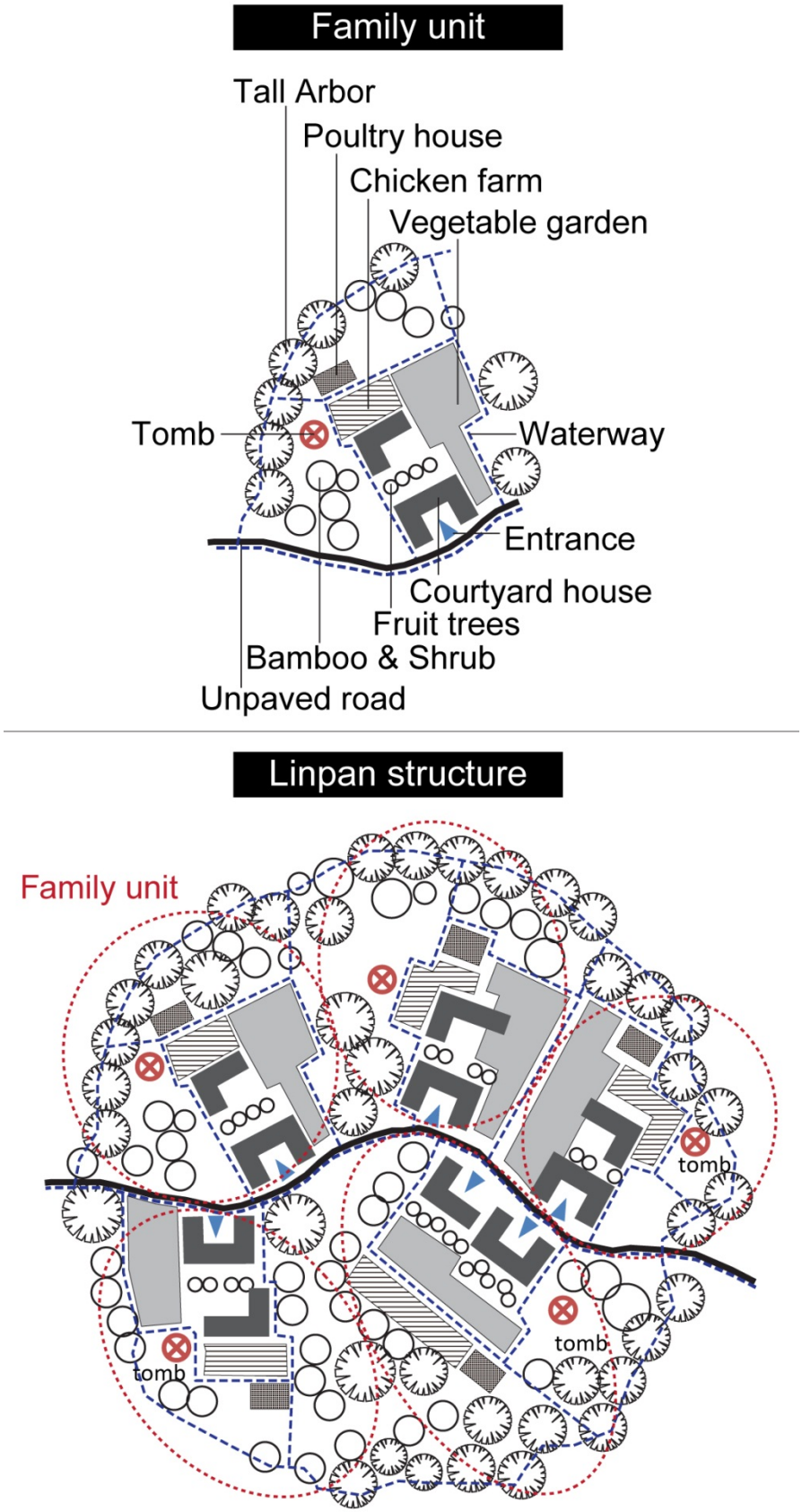


Figure 4-26 Pattern of Traditional Linpan Structure

4.3.2.3 Traditional lifestyles and architectural patterns

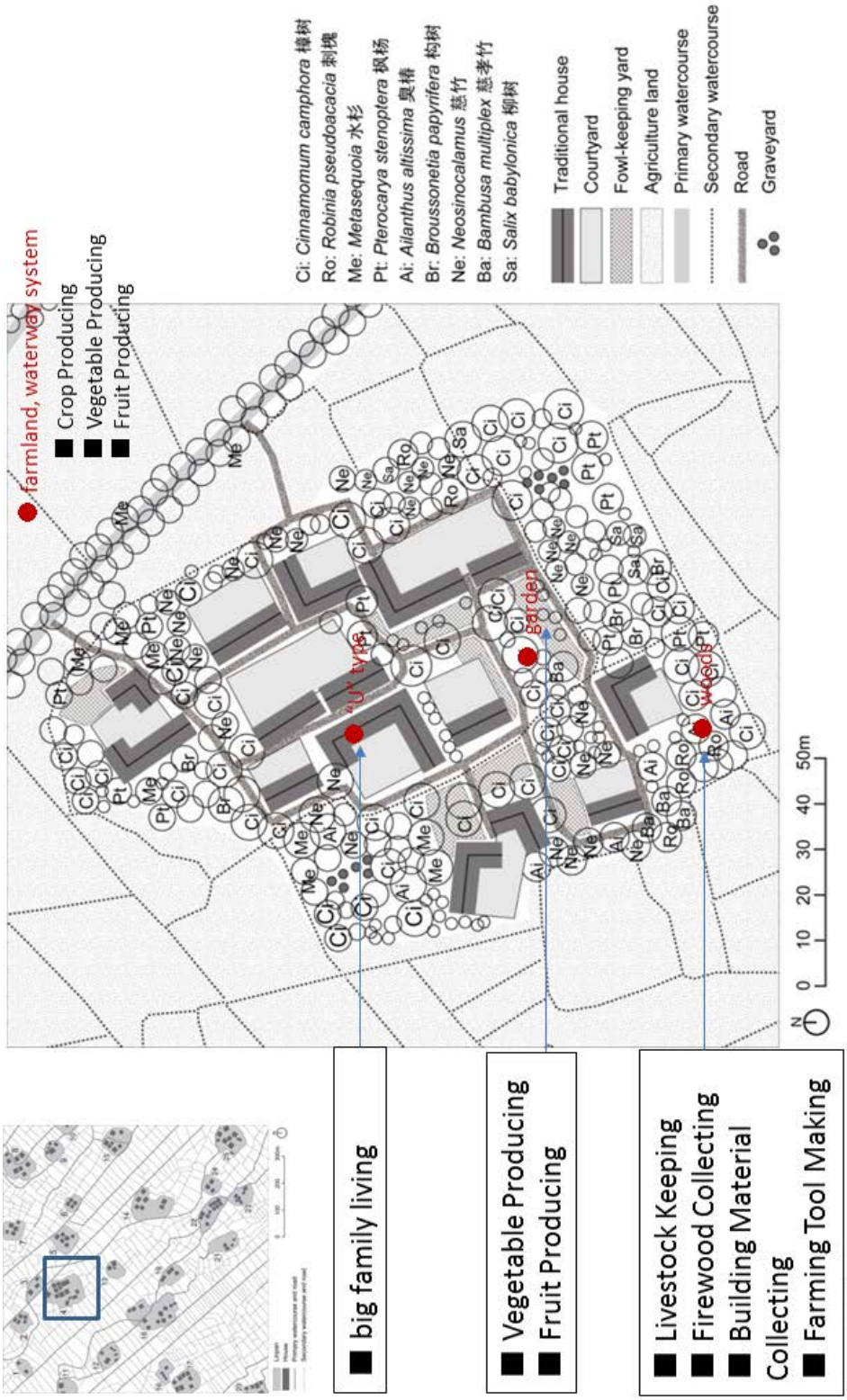


Figure 4-27 Agroforestry System of No.4 Linpan

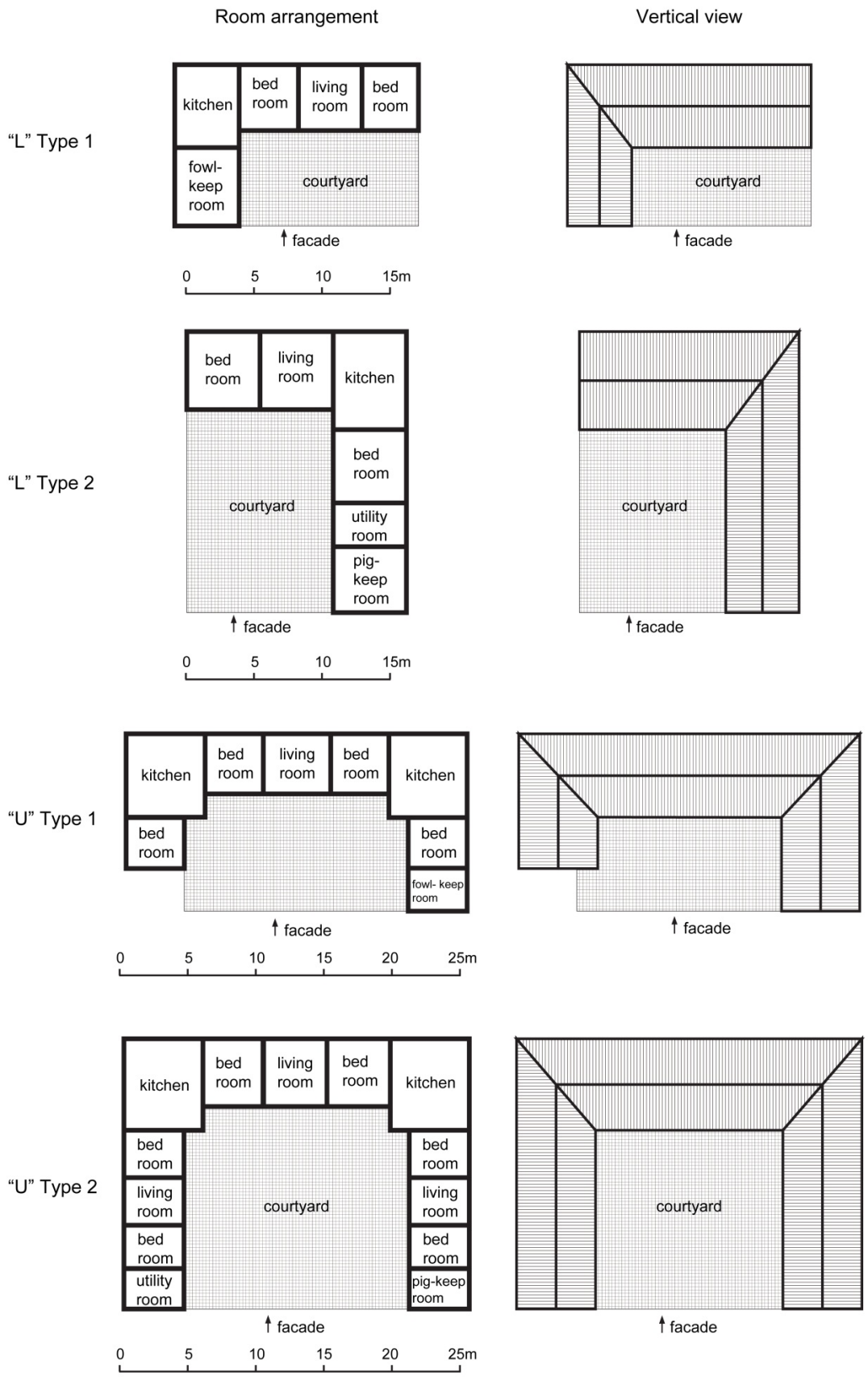


Figure 4-28 Type of Courtyard House in Linpan

Traditional buildings in Linpan have very unique patterns. One of the most distinctive characteristics of the houses in Linpan is the courtyard-centered arrangement of rooms. The floor plan of these houses is usually in L or U shape. Generally the U-shaped buildings are built before 1950s and they are very suitable for big family with more than three generations of family members.

The belief of veneration for ancestors is also reflected on the plane arrangement of buildings. In most cases, the room situated right in the center of the house facing the courtyard is the living room, where the ceremonies of ancestor worships during holidays or New Year and it is also the space for daily living and reception of quests. Hence no matter how the plane arrangement of buildings is changed, the principle of making the courtyard and living room as the center of the plane arrangement is one of the distinctive characteristics of traditional households in Linpans.

The arrangement of kitchens is also in similar line of concept. In the U-shaped buildings, two bigger rooms in the corners are used as kitchens to meet the daily needs of the generations of family members and the kitchens are also used as dining room as well. While in the case of smaller L-shaped households, the bigger room in the corner is also used as kitchen and dining room. This kind of large kitchen is suitable for culinary technique that depends on wood-fired clay stoves and it also offer plenty of space for storage of grains and cookware.

Concerning the living space of generations of family members, elders live in the main house (the row of rooms with their façade facing the courtyard) while younger generations live in the side wings (single or two rows of rooms next to the main house). This kind of L and U-shaped plane arrangement reflects the traditional hierarchy order of Chinese culture that respects the elders fully.

Finally, traditional buildings in Linpans also serve to production function. The eggs, meat and pork needed are from the small-scaled livestock farming in the house. The place for livestock farming is usually in the endmost rooms of the L and U-shaped houses. Due to the order produced, these rooms are established in rooms that are farthest from the living room. The livestock farming tradition is also an epitome of agrarian society.

Figure 4-29 Traditional Courtyard Corner.

In addition, the courtyard surrounded by the house is also a place with multiple functions. First, water for drinking and daily use depend upon groundwater, hence people will dig a well in one corner of the courtyard and take water from it. Second, with the humid climate that has more cloudy days in Chengdu Plain, the laundry, crops and firewood all need places for sundry; hence the soil in the courtyard is tamped for this function. Also, the threshing of crops and process of rice are all completed in the courtyard. Further, the manufacturing of furniture, agricultural utensils, daily necessities and handicrafts requires the big space of courtyard for production as well; the courtyard is therefore a necessary working space for rural lives.

Further, the courtyard also serves to recreational function for the family members to rest and to communicate. Also, with the lack of public places like squares in Linpans, this kind of semi-private courtyards becomes necessary space for activities such as communication, tea drinking and mahjong.

With the analysis above, the essence of traditional architectures in Linpans lies in the tradition of respecting elders via hierarchic arrangement of buildings that combines the L and U-shaped spatial structure formed by the large courtyard with multiple functions. It is also the materialization of traditional lifestyles of the rural villagers.

4.3.2.4 Rural Production and Forest Landscape in Linpans

Table 4-9 Species of Arbor and Shrub in Traditional Linpan

Name in Chinese		Scientific Latin Name	Abbreviation	Frequency	Hight	Place					Function			Cultivating History		
						R	W	N	F	C	O	E	S	Ⅰ	Ⅱ	Ⅲ
1	樟树★	*Cinnamomum camphora*	Ci	H	①	●	●			●	●			●		
2	刺槐★	*Robinia pseudoacacia*	Ro	L	②	●								●		
3	水杉★	*Metasequoia*	Me	L	①	●								●		
4	杨树★	*Populus*	Po	H	①	●								●		
5	枫杨★	*Pterocarya stenoptera*	Pt	L	①	●								●		
6	臭椿★	*Ailanthus altissima*	Ai	L	②		●							●		
7	构树★	*Broussonetia papyrifera*	Br	L	②	●	●							●		
8	慈孝竹★	*Bambusa multiplex*	Ba	M	③	●				●				●		
9	慈竹★	*Neosinocalamus*	Ne	M	②	●				●				●		
10	柳树★	*Salix babylonica*	Sa	H	②	●	●				●			●		

【Frequency】H=High(70-100%)、 M=Medium(30-70%)、 L=Low(1-30%)

【Place】R=Roadside、W=Waterfront、N=Nursery、F=Farmland、C=Courtyard

【Function】O=Ornament、E=Eating、S=Selling

【Cultivating History】Ⅰ=1949～1978、Ⅱ=1978～2000、Ⅲ=2000～present

【Hight】①=Arbor（10-15m）、②=Arbor（3-10m）、③=Shrub（1-3m）、④=Vegetables or Crops

★：Native species

Another distinctive characteristic of Linpan can be found in the forests surrounding the houses in addition to the architectural patterns. In traditional agrarian society, the first need of the Linpan villagers is the wood material for building constructions. On account of the distant location of the forests in the mountains from the plain, large arbors are planted on the spot for providing the materials for construction. With the deep and fertile soil of the plain, the growth of arbors and their height are very decent. Their texture is suitable for the roof beams of the traditional buildings and also the furniture.

Based on the survey on the villagers, it is found that *Cinnamomum camphora*, *Merasequoia* and *Pterocarya stenoptera* are three most common material for roof beams in the buildings. As a result, they are widely planted around each household. These three species of trees enjoy sunshine and have large size. When gown up, these trees can reach up to 20m and more, hence the most iconic symbol of Linpan landscapes.

Traditional culinary style on plains with rice farming as the primary production involves the burning of crop residue and the use of wood-fired clay stoves. However, the crop residue can only be gathered when harvested, hence the arbors and bushes surrounding the house are also the materials for firewood after sundry. In addition to

arbors, the villagers also plant tufted tall bamboos known as *Neosinocalamus* because they are suitable for the manufacturing of farming utensils or daily necessities such as tables, benches and baskets.

Figure 4-30 Main Traditional Plant Species in Linpan

These plants together constitute the distinctive layers of tall arbors, medium arbors (including the bamboo forest), and small arbors (including bushes) surrounding Linpans.

Figure 4-31 Image of Traditional Linpan[1] [80]

Figure 4-32 Livestock Keeping Space under Woods in Linpan

Moreover, the villagers will make bamboo fences under the trees to herd the chickens, ducks and geese for their eggs and meat. The feces of these livestock are then used as organic fertilizer for the forests. As a result, the spaces between trees serve as the working space and also livestock farming space. This kind of multiple land use approach is the best production efficiency developed in agrarian societies.

Agroforestry is an integrated approach of using the interactive benefits from combining trees and shrubs with crops and/or livestock. It combines agricultural and forestry technologies to create more diverse, productive, profitable, healthy, and sustainable land-use system [81]. With the analysis above, the intrinsic character of Linpan is a typical agroforestry system (Figure 4-33).

[1] Figure source: 都江堰市檔案局（館）(Ed.). (2010) *都江堰百年檔案記憶*. The photo was taken by a British botanist and photographer on 16th June, 1908

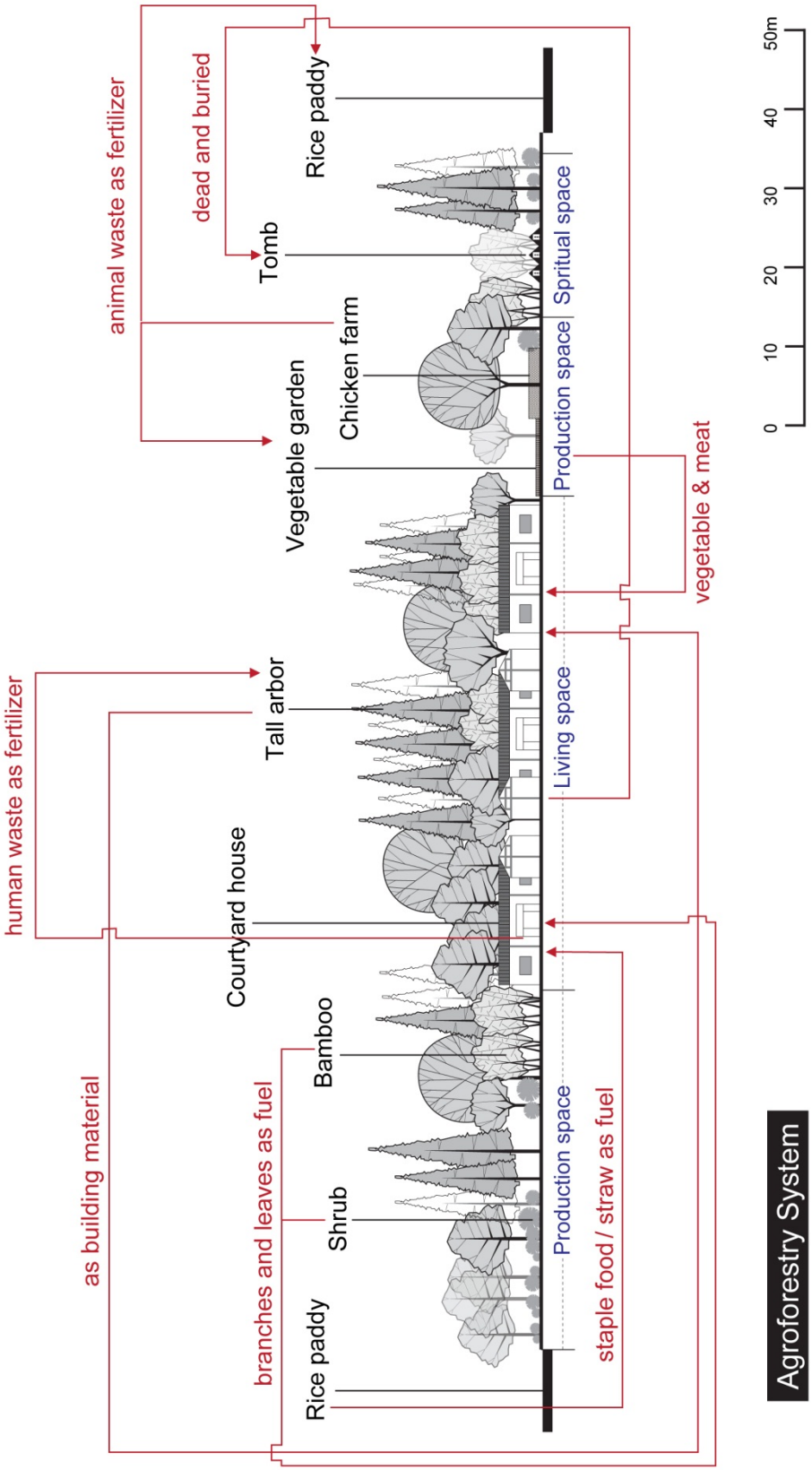


Figure 4-33 Agroforestry System inside Linpan

4.3.3 Agricultural Land

4.3.3.1 Crop Species and Farming Landscape

Table 4-10 Vegetation in Agricultural Land (before 1980)

Name in Chinese		Scientific Latin Name	Abbreviation	Frequency	Hight	Place					Function			Cultivating History		
						R	W	N	F	C	O	E	S	Ⅰ	Ⅱ	Ⅲ
35	油菜	*Brassica chinensis L.*	Br	H	④				●			●	●	●		
36	枇杷	*Eriobotrya japonica*	Er	M	②				●			●	●	●		
37	芋头	*Colocasia esculenta*	Co	H	④				●			●	●	●		
38	慈姑	*Sagittaria sagittifolia*	Sa	H	④				●			●	●	●		
39	花生	*Arachis hypogaea*	Ar	H	④				●			●	●	●		
40	黄豆	*Giycine max*	Gi	H	④				●			●	●	●		
41	玉米	*Zea mays*	Ze	H	④				●			●	●	●		
42	茄子	*Solanum melongenaL.*	So	H	④				●			●	●	●		
43	花椰菜	*Cauliflower*	Ca	H	④				●			●	●	●		

【Frequency】H=High(70-100%)、 M=Medium(30-70%)、 L=Low(1-30%)

【Place】R=Roadside、W=Waterfront、N=Nursery、F=Farmland、C=Courtyard

【Function】O=Ornament、E=Eating、S=Selling

【Cultivating History】Ⅰ=1949～1978、Ⅱ=1978～2000、Ⅲ=2000～present

【Hight】①=Arbor（10-15m）、②=Arbor（3-10m）、③=Shrub（1-3m）、④=Vegetables or Crops

★：Native species

Farmlands in plain area are divided into irrigated and unmitigated farmlands. Primary grain crops before 1980 are rice, corns, wheat and sorghum and oil crops such as rapes, peanuts and soybeans.

According to four seasons, the crop landscapes are: rapes for spring, rice for summer, vegetables for autumn and wheat for winter.

4.3.3.2 Distribution of Crop Landscape

The land use conditions are relatively simple in the traditional agrarian era with all lands other than Linpans being farmlands. Also, due to the main production are grain, large-scaled paddy fields and lands filled with wheat or rape flowers are thus the characteristic crop landscapes.

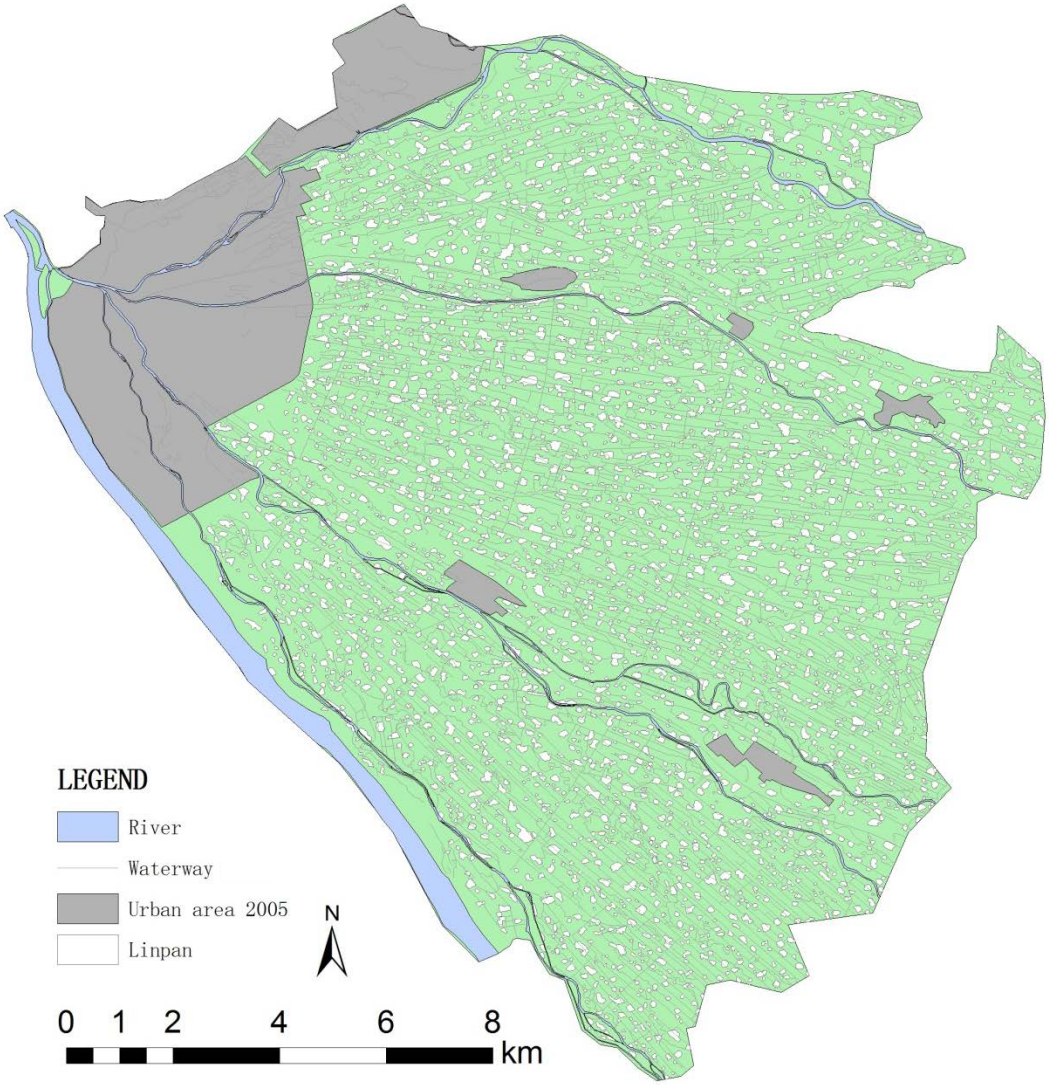


Figure 4-34 Agricultural Land Distribution in Fan-Shape Area[1]

Also, with the self-sufficient traditional agricultural works, the farmers did all farm works with their own efforts on seeding, planting and harvesting hence no large machines were used in production. The lands were therefore unnecessary to be upright and foursquare. The irregular shapes of the lands and banks are highly relevant to the labor work techniques of the farmers. In addition, before 1978, the field blocks of the farmlands were not properly organized; hence the field blocks of the lands nowadays still remain irregular shapes.

[1] With no satellite pictures available of that area before 2005, the explicit mapping of the Linpan positions and the distribution of farmlands in Traditional Agrarian Era before 1978 cannot be accomplished precisely. This figure is a conjecture based on the 2005 satellite picture of the distribution of farmlands in Traditional Agrarian Era.

4.3.4 Watercourse and Road System

In the boundless alluvial fan plain, the watercourse is with high flexibility, as the villagers will alter the course according to the shape of the farmlands. Also, the watercourse is usually connected with the roads, hence the overlaps of the road system and the watercourse in this area

4.3.4.1 Irrigation Pattern and Watercourse System

The irrigation system in the alluvial fan plain is divided hierarchically. The source of water came from the ancient Dujiangyan Irrigation System and is further diverted into four canals with identical spacing in between. Through the intakes, the water are thus channeled to lands via first rank canals and then further directed to paddy fields via second and third rank canals.

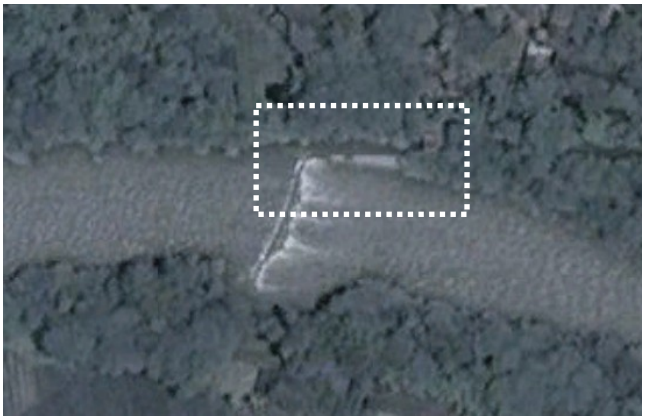


Figure 4-35 Image of Intake from Canal

Figure 4-36 Image of Canal

As shown in Figure 4-35, the design of traditional intakes are more sophisticated as

the weirs were built in canals to block and to direct the water through the intakes that are attached to the ends of these weirs and flowing towards the irrigation canals. Also the height of the weirs is with particular specification to ensure the spare water is spilled out and proceeds flowing downstream. With this delicate design, in rainy seasons when the water amount is sufficient, redundant water will not be diverted to lands and cause floods. Further, with the growth needs of the rice, the inflow, retention and drainage of water are controlled by a set of irrigation system (mainly by the floodgates) to ensure the regular growth of rice and the production of crops even with the threat of floods and droughts.

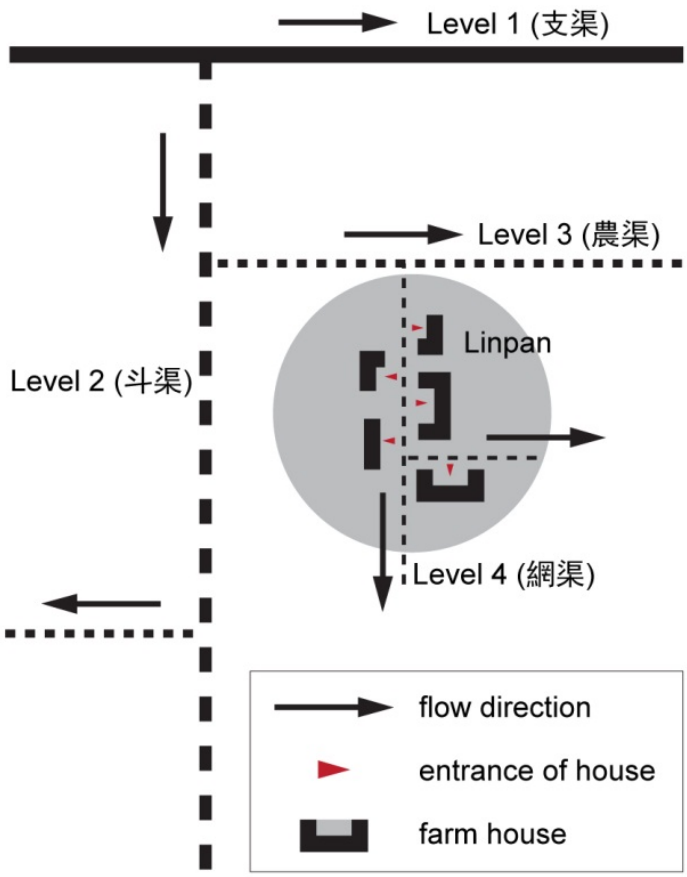


Figure 4-37 Hierarchy of Irrigation Waterways

As in Figure 4-37, the canals that direct water to fields through the intake can be further divided into four levels. Level 1 canals (branch canal) are in charge of directing water to all corners in the fan-shape area and the watercourse network thus formed covers the whole region (Figure 4-38) Level 2 (lateral canal) canals will take water from Level 1 (branch canal) to distribute water to the Level 3 canals (field canal) that are at the edge of the water system and lead water to individual fields. While Level 4 canals (net canals) exist only inside Linpans and they serve to irrigate trees

and vegetables and offer drinking water for the livestock in Linpan.

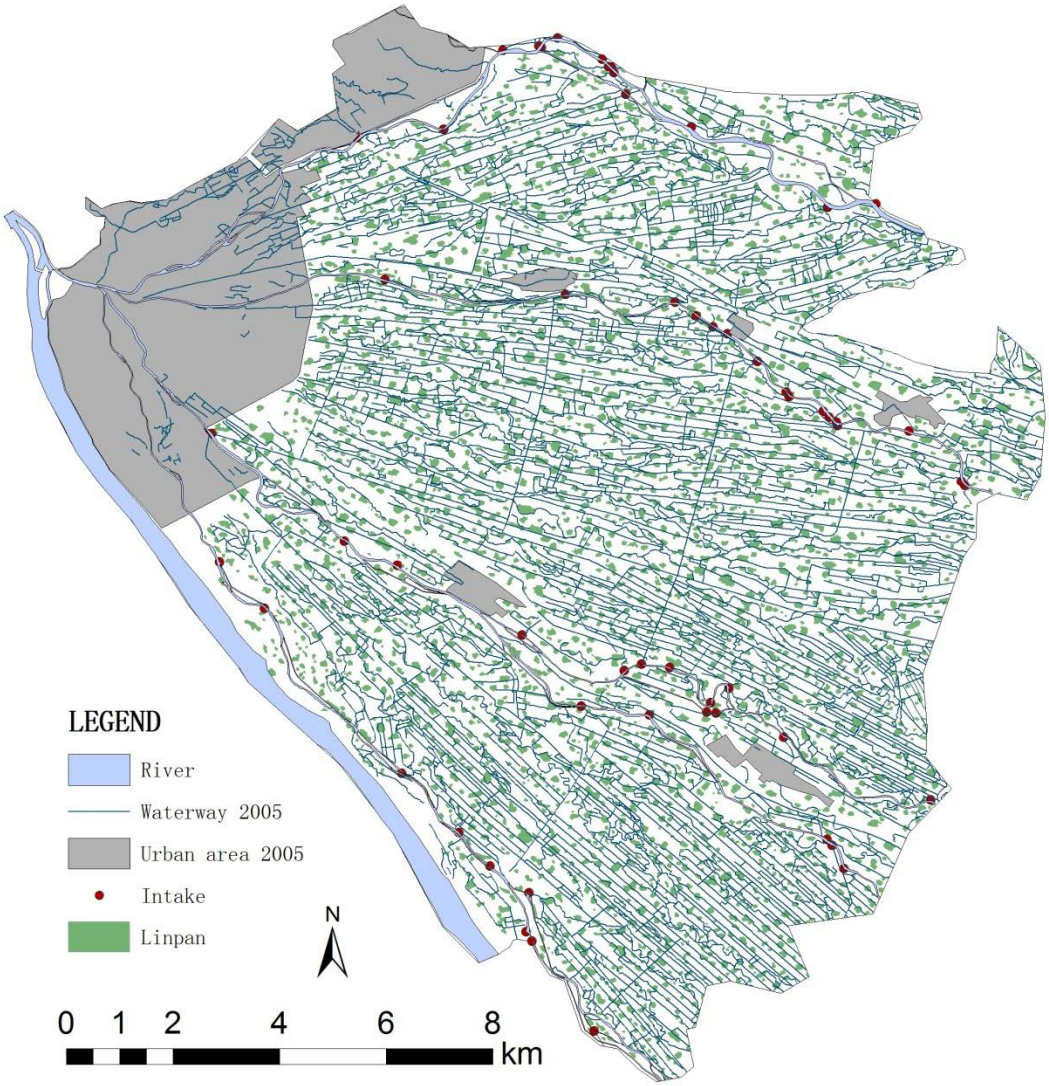


Figure 4-38 Watercourse (Level 1) Network in Fan-shape Area[1]

[1] With no satellite picture available of that area before 2005, the watercourse distribution of this area before 1978 cannot be precisely charted. This figure takes reference from the primary irrigation system in the 2005 satellite picture of that area for the elaboration on the distribution characteristics of the watercourse in Traditional Agrarian Era. The direction of partial watercourse had been organized and revised during land coordination in 1980s, but no changes are found in the traditional irrigation methods.

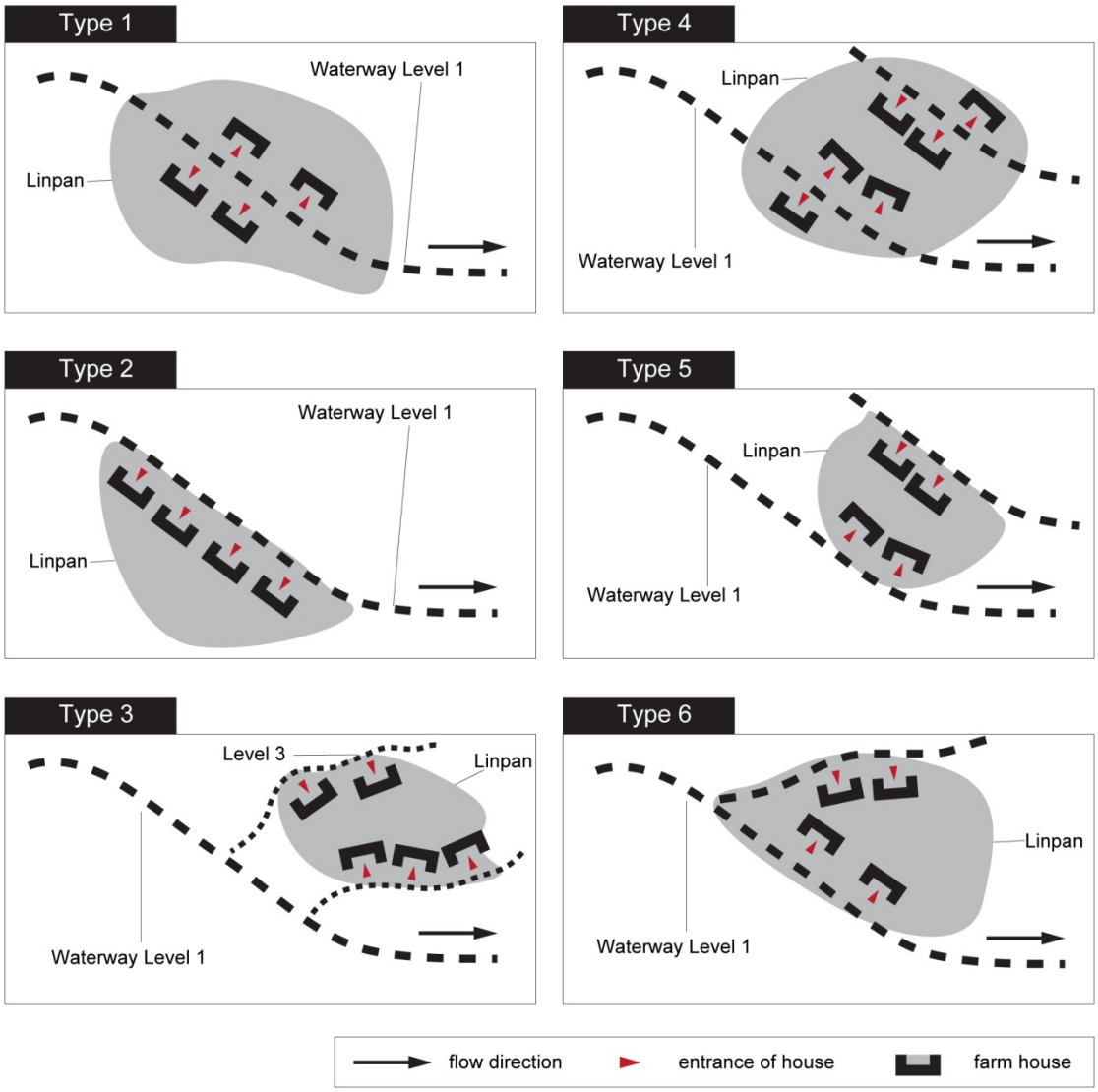


Figure 4-39 Type of Relationship between Linpan and Waterway

From the usage of water system, almost all Linpans are closely related to the irrigation system and are connected by them as well. It is noticed that where there are artificial water systems, there are Linpans.

From the spatial relation of Linpan and the watercourse, six types (Figure 4-39) are found respectively. In these six types of spatial relation between Linpan and watercourse, it is noticed that one Linpan will connect to more than one Level 1 waterways. For the convenience of transportation, usually the residences in Linpan will be built along the roads. The entrances of residences are mostly vertical to the road direction; hence due to the overlapping of watercourse and road networks, it seems that all households are distributed against the watercourse visually.

Figure 4-40 Images of 4 Level Watercourses

4.3.4.2 Transportation Pattern and Road System

As in Figure 4-41, the road system and the watercourse are basically overlapped and they were built simultaneously with the excavation of the irrigation systems, a work that involves tramping the earth dug out when building the irrigation canals to establish the roads along the canals. To prevent the earth of the canals and roads from collapsing, in addition to the traditional method of pebbling the canal walls, large arbors are planted along both sides of the roads and main irrigation canals to hold the soil via their root systems. As a result, linier tree landscapes are formed along the watercourse and roads.

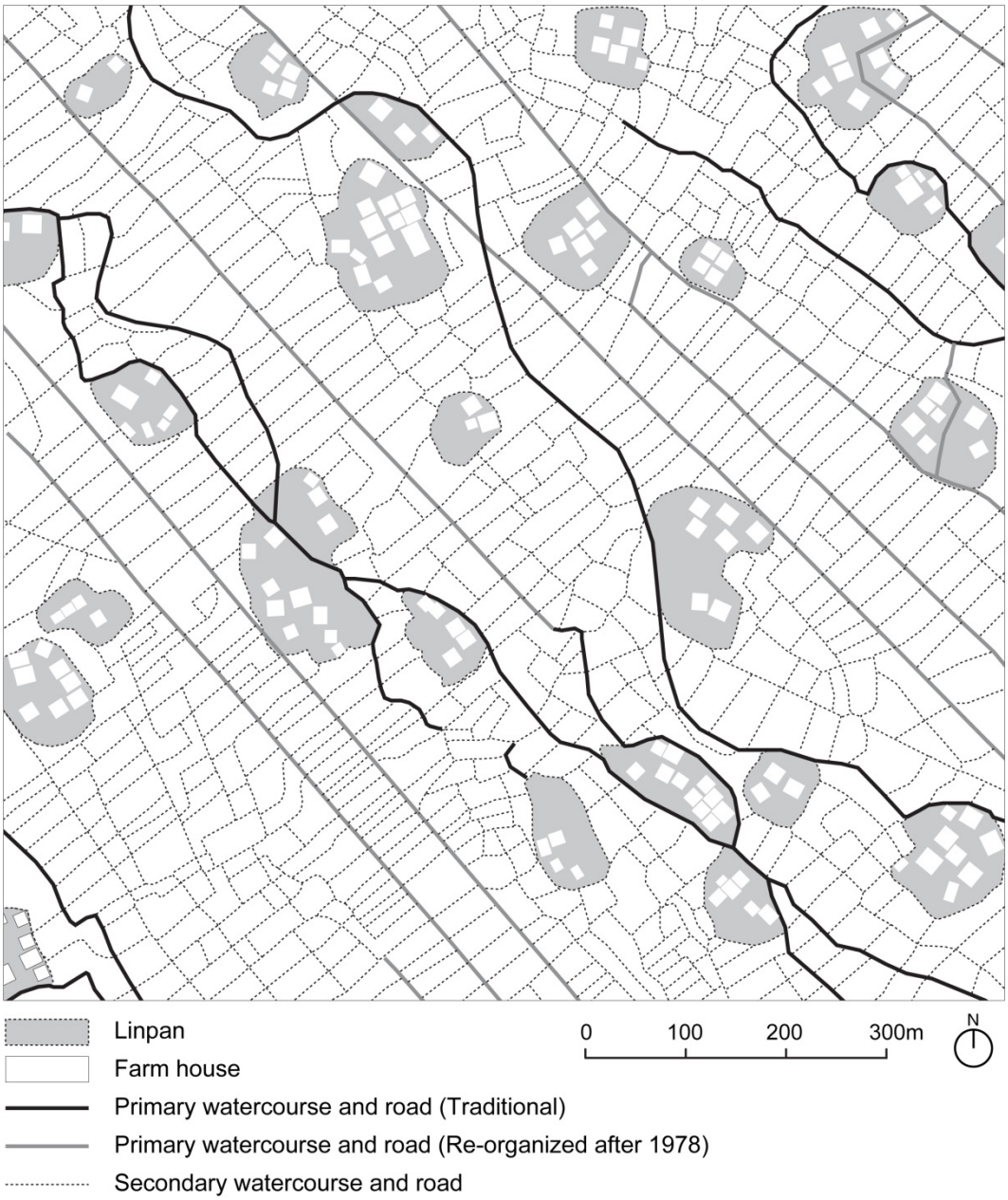


Figure 4-41 Distribution of Waterway and Road System

4.4 Early Modernization Era (1978-2008)

The 30 years from 1978 to 2008 will be regarded as the Early Modernization Era of the Dujiangyan City and further discussion on the transitions of the rural cultural landscapes in this period of time is as the following.

4.4.1 Urbanization and Urban Sprawl

In this particular era, industrialization of the cities was developed rapidly. The surplus

workforce form the rural areas moved gradually to the urban areas and started the urbanization. This phenomenon led to the transition of a large amount of rural lands to urban lands (including residential and industrial lands), hence the fast expansion of urban areas (Figure 4-3). This way of urbanization is like the making of pizza, with primary urban areas expanding and rural areas shrinking.

4.4.2 Rural Community

In rural communities, with the development of the economy and increase of income, villagers spontaneously upgraded and modernized each infrastructure. This spontaneous modernization led to landscape transitions as following.

4.4.2.1 Infrastructure Improvement in Linpan

Figure 4-42 Image of Concrete Farmhouse in Linpan

The modernization of infrastructure in Linpans is mainly concerning the change of construction materials. With the ferroconcrete, bricks and moldboards that framed the structure of the houses, the comfort and sanitation condition are improved greatly. The change of materials not only solves the problem of wood and bricks based houses for they rot easily but also lengthens the effective duration of the constructions. More, with the replacement of paper windows for glass windows, the indoor lighting is improved. It is also noticed that the exterior façade of the building are usually tiled white. Further, with the installation of roof drains, shed roofs are no longer necessary and thus most houses in Linpans built after 1978 no longer have shed roofs. In addition, the change of courtyards is mainly on the transition from traditional tramped earth ground to concrete ground and parking function is also added to the traditional functions of these courtyards with the purchase of vehicles.

But what is not changed is the L or U shaped plane of the buildings and the layouts of the rooms. Also, the courtyard used as sundry field that is surrounded by the house is still necessary. As a result, in the spontaneous modernization of the villagers, traditional building layouts are preserved as the continuance of the traditional lifestyles.

4.4.2.2 Outflow of Population and Hollowed Linpan

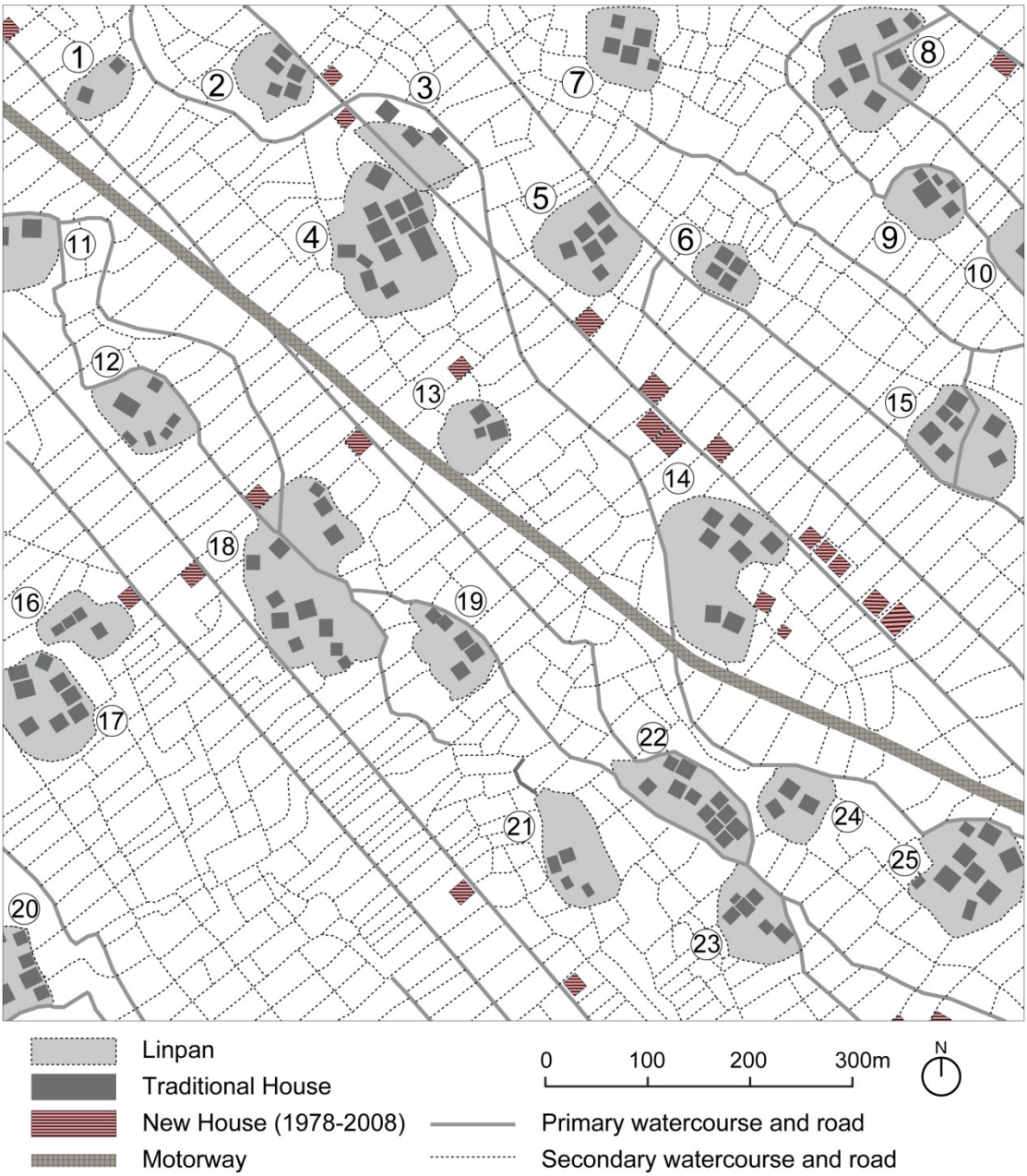


Figure 4-43 Layout Plan of Mesh K・6 (2005)

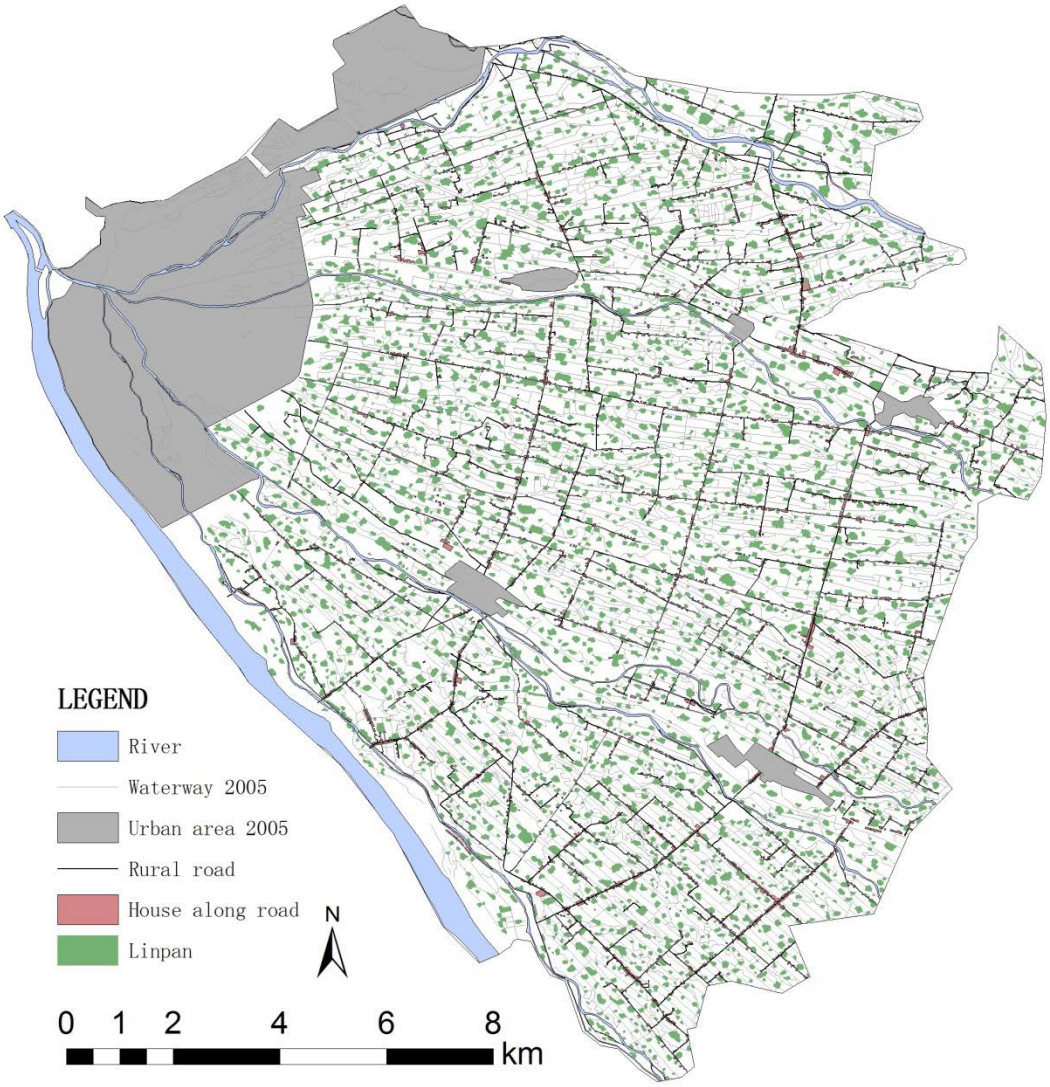


Figure 4-44 Overview of Distribution of Newly Built House

Since 1980, the need of transportation of agricultural products led to the increase of automobile purchase amount and the quality of roads in rural areas. For the convenience of transportation, new houses owned by the younger generations of the Linpans were built along the primary roads and especially in the intersection areas. This phenomenon of building houses along the roads is also a good demonstration of the outflow of populations from Linpans with the improvement of transportation conditions.

Since 1978, as the younger generation of the rural areas moving to cities due to their occupations or building new houses along the roads in rural areas, the hollowing of

traditional Linpans gradually arises. In those hollowed Linpans, the decay of the derelict houses is very serious and the plants (arbors, bushes and bamboos) are flourish with dense canopies without the use of people.

4.4.2.2 Rural Tourism and Tourism-Oriented Linpan

Table 4-11 Plant Species in Tourism-Oriented Linpan

Name in Chinese		Scientific Latin Name	Abbreviation	Frequency	Hight	Place					Function			Cultivating History		
						R	W	N	F	C	O	E	S	Ⅰ	Ⅱ	Ⅲ
1	樟树★	*Cinnamomum camphora*	Ci	H	①	●	●			●	●			●		
2	刺槐★	*Robinia pseudoacacia*	Ro	L	②	●								●		
3	水杉★	*Metasequoia*	Me	L	①	●								●		
4	杨树★	*Populus*	Po	H	①	●								●		
5	枫杨★	*Pterocarya stenoptera*	Pt	L	①	●								●		
6	臭椿★	*Ailanthus altissima*	Ai	L	②		●							●		
7	构树★	*Broussonetia papyrifera*	Br	L	②	●	●							●		
8	慈孝竹★	*Bambusa multiplex*	Ba	M	③	●				●				●		
9	慈竹★	*Neosinocalamus*	Ne	M	②	●				●				●		
10	柳树★	*Salix babylonica*	Sa	H	②	●	●				●			●		
11	桉树	*Eucalyptus*	Eu	H	①	●							●		●	
12	银杏	*Ginkgo biloba*	Gi	H	②			●					●			●
13	乐昌含笑	*Michelia chapensis*	Mi	L	②	●		●		●			●			●
14	黄葛树	*Ficus virens*	Fi	L	②	●				●	●			●		
15	桢楠	*Phoebe zhennan*	Phoe	H	②			●					●			●
16	腊梅	*Chimonanthus praecox*	Ch	H	②	●		●		●	●		●			●
17	广玉兰	*Magnolia Grandiflora Linn.*	Mag	M	②	●					●				●	
18	杜英	*Elaeocarpus sylvestris*	El	M	②	●					●					●
19	海桐	*Pittosporum tobira*	Pi	M	③	●				●	●					●
20	鸡爪槭	*Acer palmatum*	Ace	L	③	●		●		●	●		●			●
21	榕树	*Ficus microcarpa*	Fi	L	②					●	●			●		
22	桂花	*Osmanthus fragrans*	Os	H	③	●		●		●	●		●			●
23	紫薇	*Lagerstroemia indica*	La	H	③			●		●	●		●			●
24	紫叶李	*Prunus ceraifera*	Pr	M	③			●			●		●			●
25	鹅掌柴	*Schefflera arboricola*	Sc	M	③			●			●		●			●
26	夏鹃	*Rhododendron pulchrum*	Rh	H	③			●			●		●			●
27	茶花	*Camellia japonica*	Cam	M	③	●				●	●		●			●
28	八角金盘	*Fatsia japonica*	Fa	H	③			●					●			●
29	木芙蓉	*Hibiscus mutabilis*	Hi	M	③		●				●					●
30	栀子花	*Gardenia jasminoides*	Ga	M	③	●				●	●				●	
31	石楠	*Photinia serrulata Lindl.*	Phot	M	③	●					●					●
32	罗汉松	*Podocarpus macrophyllus*	Po	M	③					●	●					●
33	桃树	*Prunus persica*	Pr	M	③				●		●	●		●		

【Frequency】H=High(70-100%)、 M=Medium(30-70%)、 L=Low(1-30%)

【Place】R=Roadside、W=Waterfront、N=Nursery、F=Farmland、C=Courtyard

【Function】O=Ornament、E=Eating、S=Selling

【Cultivating History】Ⅰ=1949～1978、Ⅱ=1978～2000、Ⅲ=2000～present

【Hight】①=Arbor（10-15m）、②=Arbor（3-10m）、③=Shrub（1-3m）、④=Vegetables or Crops

★：Native species

In late 1990s, with the increase in the touristic and recreational needs of the people from cities and also the improvement of the transportation quality, rural areas where the Linpans are located became tourist attractions in rural area tourism for the very

first time, hence the emergence of tourism-oriented Linpans. Among these tourism-oriented Linpans, the residents will improve the environment by renovating their houses as restaurants and invite tourists from urban areas to experience the life in rural areas, the Linpan hence became a daily resort place for the urban tourists.

Also, for the decoration of Linpans, partial traditional species of trees are removed and replaced with gardening trees with higher aesthetic value. This change of vegetation composition in Linpans leads to major changes, making the importance of aesthetic value surpassing pragmatic value.

4.4.3 Agricultural Land

In those 30 years between 1978 and 2008, the change of agricultural lands is mostly in the arrangement of field grids, the crop species and the emergence of nursery for ornamental plants. These three changes will be further discussed in the following sections.

4.4.3.1 Arrangement of the Field Grids

After 1978, for the efficiency of production, machines were introduced to the rural areas for farming, and thus promoted the arrangement of field grids. For mechanized farming, irregular field blocks resulted from the traditional farming era were arranged to squares with similar area measurement.

4.4.3.2 Crop Species Change

Also after 1978, based on the traditional agricultural products, vegetables and crops with higher economic value were introduced to Linpans. Especially since late 1990s, the planting of fruits became more popular. The massive plating of kiwifruits (Actinidia chinensis), in particular, changed the traditional crop landscape, which used to be composed of annual crop such as rice, wheat, corns and rapes, hence the replant of crop was needed every year. However, with the introduction of kiwifruits, a kind of perennial vine, the crop landscapes were standardized for the first time. Similar to the vineyards in Europe or the Longjing tea gardens in West Lake, Hangzhou, the landscape formed by the crop itself enjoys high reputation.

4.4.3.3 Appearance of Nursery for Ornamental Plants

On account of the urbanization of Dujiangyan City and the surrounding areaas, a large amount of ornamental plants is needed for the green spaces in residences, public facilities, parks and roads. This demand of ornamental plants became a good business for the villagers in Linpans. Nursery gardens for the ornamental plants with higher economic value than that of crops were thus established around the farmlands of Linpans. There were also households, whose young workforces moved out, planting ornamental arbors that require only little care or contracting out their lands for professional agencies to plant seedlings. These seelings of arbors bushes together formed landscape of nursery for ornamental plants.

Table 4-12 Plant Species in Nursery and farmland

Name in Chinese		Scientific Latin Name	Abbreviation	Frequency	Hight	Place					Function			Cultivating History		
						R	W	N	F	C	O	E	S	Ⅰ	Ⅱ	Ⅲ
12	银杏	*Ginkgo biloba*	Gi	H	②			●					●			●
13	乐昌含笑	*Michelia chapensis*	Mi	L	②	●		●		●			●			●
14	黄葛树	*Ficus virens*	Fi	L	②	●				●	●			●		
15	桢楠	*Phoebe zhennan*	Phoe	H	②			●					●			●
16	腊梅	*Chimonanthus praecox*	Ch	H	②	●		●		●	●		●			●
17	广玉兰	*Magnolia Grandiflora Linn.*	Mag	M	②	●					●				●	
18	杜英	*Elaeocarpus sylvestris*	El	M	②	●					●					●
19	海桐	*Pittosporum tobira*	Pi	M	③	●				●	●					●
20	鸡爪槭	*Acer palmatum*	Ace	L	③	●		●		●	●		●			●
21	榕树	*Ficus microcarpa*	Fi	L	②					●	●			●		
22	桂花	*Osmanthus fragrans*	Os	H	③	●		●		●	●		●			●
23	紫薇	*Lagerstroemia indica*	La	H	③			●		●	●		●			●
24	紫叶李	*Prunus ceraifera*	Pr	M	③			●			●		●			●
25	鹅掌柴	*Schefflera arboricola*	Sc	M	③			●			●		●			●
26	夏鹃	*Rhododendron pulchrum*	Rh	H	③			●			●		●			●
27	茶花	*Camellia japonica*	Cam	M	③	●				●	●		●			●
28	八角金盘	*Fatsia japonica*	Fa	H	③			●					●			●
29	木芙蓉	*Hibiscus mutabilis*	Hi	M	③		●				●					●
30	栀子花	*Gardenia jasminoides*	Ga	M	③	●				●	●				●	
31	石楠	*Photinia serrulata Lindl.*	Phot	M	③	●					●					●
32	罗汉松	*Podocarpus macrophyllus*	Po	M	③					●	●					●

【Frequency】H=High(70-100%)、 M=Medium(30-70%)、 L=Low(1-30%)

【Place】R=Roadside、W=Waterfront、N=Nursery、F=Farmland、C=Courtyard

【Function】O=Ornament、E=Eating、S=Selling

【Cultivating History】Ⅰ=1949～1978、Ⅱ=1978～2000、Ⅲ=2000～present

【Hight】①=Arbor（10-15m）、②=Arbor（3-10m）、③=Shrub（1-3m）、④=Vegetables or Crops

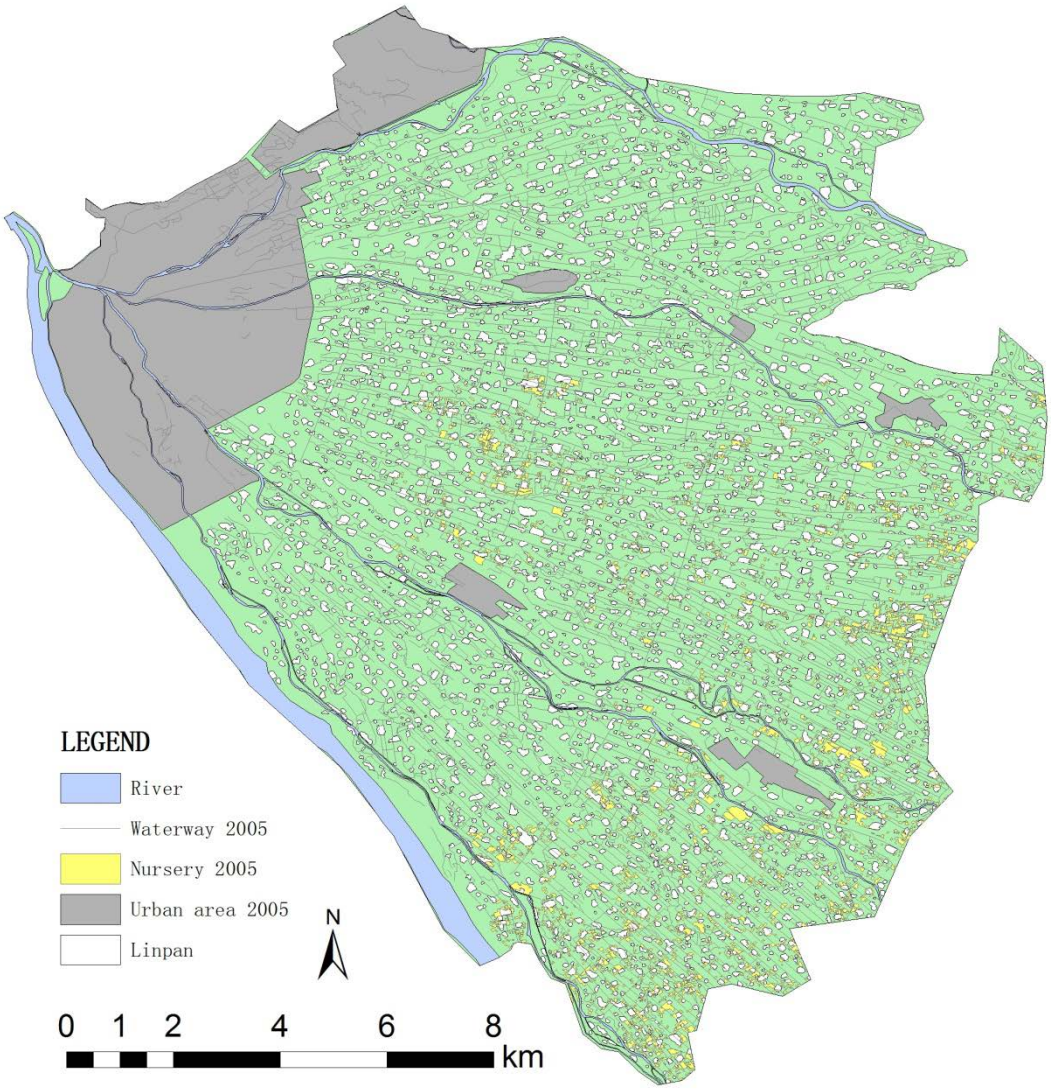


Figure 4-45 Distribution of Ornamental Plants' Nursery in 2005

Table 4-13 Nursery Area Measurement in 2005

Item	Area (km^2)
Fan-shape area	197.80
Urbanized Area（2005）	25.98
Artificial Canals	3.13
Natural River (Minjiang River)	5.28
Crop and Vegetable Field	133.19
Linpan	25.19
Nursery	5.03

Figure 4-46 Image of Nursery in Field

4.4.4 Watercourse and Road System

With the rearrangement of field grids after 1978, the watercourse and road system were also reorganized and roads widened to meet the need of automobile transportations.

4.4.4.1 Reorganization of Watercourse System

Since 1980s, the traditional pebbled walls of irrigation canals were replaced with concrete due to its solid material property. As a result, the root system of large arbors used to hold the soil was less needed. Also, on account of the decrease of crop production by the blocking of insolation by the canopies, trees planted along the roads were decreased gradually after the irrigation canals were made by concrete.

Figure 4-47 Concrete Paved Watercourse

4.4.4.2 Popularity of Motor Vehicle and Road Widening

With the rapid increase of vehicles in rural areas and the transportation need from the agricultural products and nursery seedlings, roads for vehicles based on the original

tamped earth roads were covered with concrete or asphalt for the modern transportations since late 1990s. Also, the widening of roads and the decrease of need in using the root system of street trees to hold the soil together made the arbors lined on both sides of the newly built roads lessened.

4.5 Mid-Modernization (Post-Earthquake) Era (after 2008)

In this era, the northwestern area of the Chengdu metropolitan area that takes Dujiangyan City as the lead suffered greatly from the tragic natural disasters. Hence the New Village Construction Movement that took post-earthquake reconstruction as the critical turning point brought great changes to the rural landscapes.

4.5.1 New Village Construction Project

The mega Sichuan Earthquake that stroke Sichuan Province in May 12, 2008 is confirmed to claim 69227 lives in Chengdu City and bring injuries to 374643 people leaving 17923 people missing. Among all administrative divisions in Chengdu City, Dujiangyan City was the earthquake-stricken area with casualties reached 3069 and 4388 people injured, hence one of the county-level cities receiving most constructions under the New Village Construction Movement. Different from other urbanization constructions that focused on the seismic belt in the mountains, nearly half of the New Village constructions in Dujiangyan City were in the main towns on alluvial plain and the vast Linpan areas.

Due to the post-earthquake constructions, a large amount of shelters for the earthquake victims were established around the city by the government, making the main city block of Dujiangyan City proceeding in expansion.

4.5.2 Rural Community

The rural community mentioned in this section refers specifically to the new rural villages built during the post-earthquake revival works. Other communities that have not yet received renewal works are still in early modernization phase.

4.5.2.1 Methods and Patterns of New Village Construction

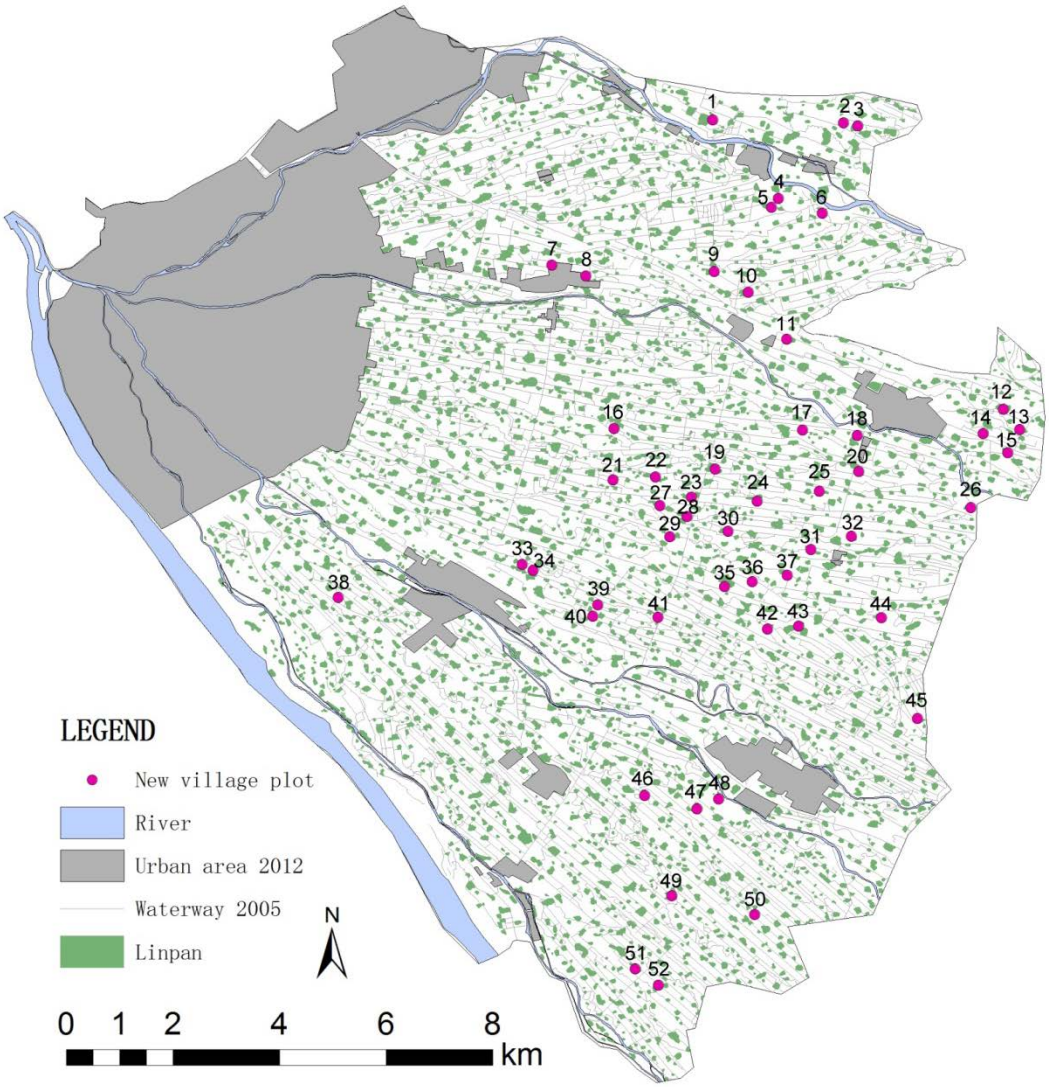


Figure 4-48 New Village Construction Project in Fan-Shape Area

According to the statistics, there are 52 new rural communities built in this alluvial fan plain (Figure 4-48). In addition to some residences that had little damage and thus received self-funded mends, the principle of the integrated plans arranged by the government for the arrangement and building construction in new rural communities includes the concentrated residences and the great improvement on the fundamental infrastructure. The construction methods can be further divided into three types (Figure 4-49, Figure 4-50).

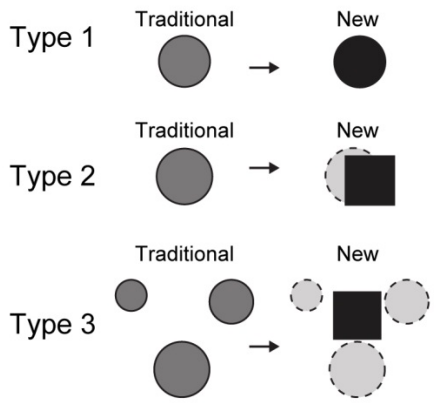


Figure 4-49 New Village Construction Pattern

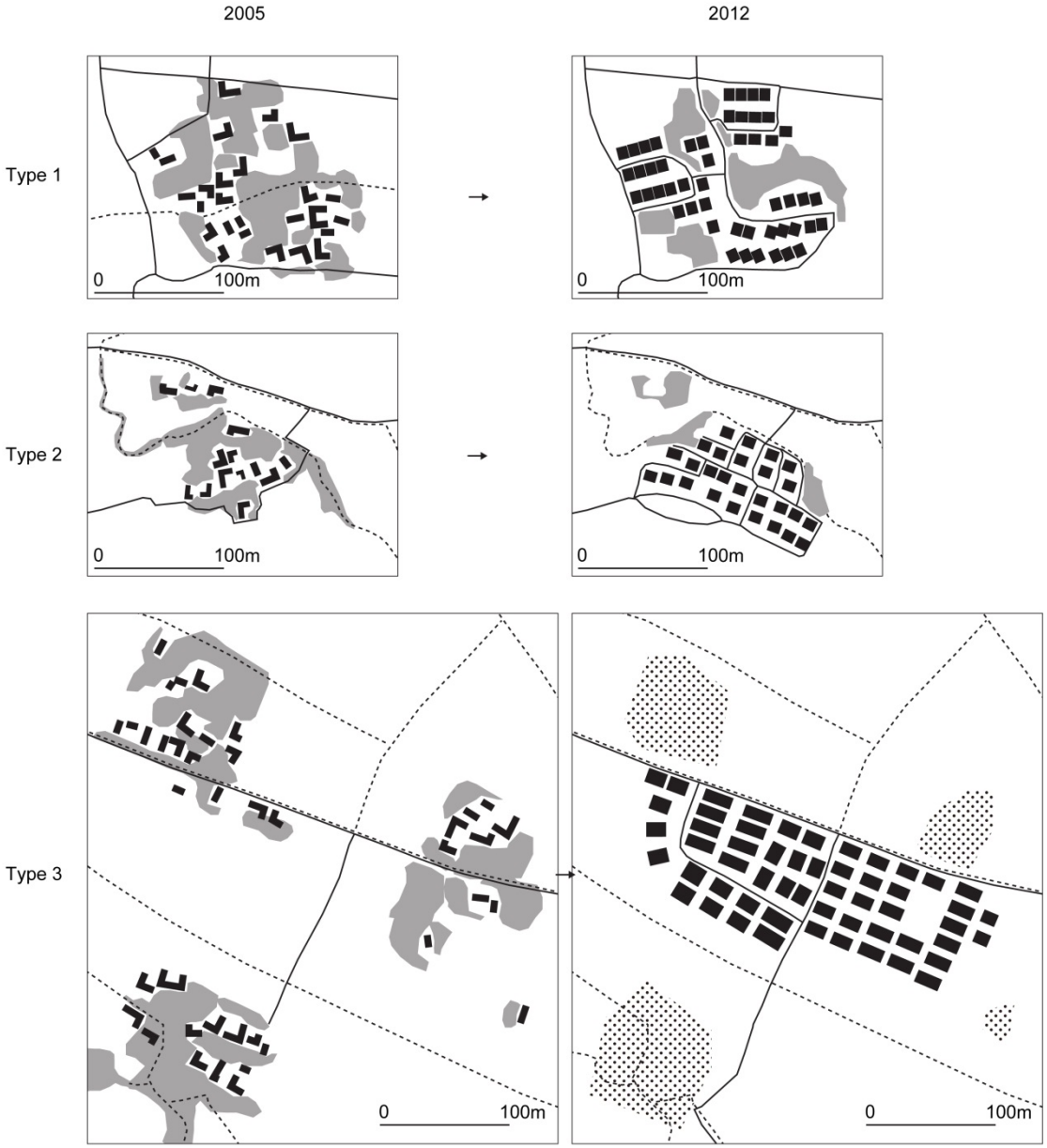


Figure 4-50 Three Types of New Village Construction Method

The first type of construction works builds new communities directly on the original spot of Linpans. This method basically does not alter the size of the original Linpans and keep most of the trees within the community. But concerning the arrangement of households in Linpans, arrayal distribution is adopted, hence increases the building density within these Linpans.

The second type of construction works builds new rural communities based on the original Linpans but with a particular consideration on the expansion of Linpans partially to meet the needs. It also emphasizes on the preservation of the original trees in the Linpans. The layout within Linpan follows also the arrayal style to increase the building density.

The third type of these construction works involves integrated residential area that gathers the villagers from Linpans around and builds new rural community on the farmlands between Linpans. As the villagers move into the new houses, their original houses in Linpan will be tore down and the lands are then rearranged for agricultural use. From the perspective of land-use, the original Linpans transform from residential area to agricultural lands. This kind of arrangement enables the preservation of agricultural lands measurement even though the new rural communities are taking up the space of farmlands. The houses in this kind of communities are still in arrayal arrangement to increase the density of buildings. Small-scaled public squares for the public activities, meetings and recreations of the villagers are also established.

If classifying according to the planners and executors of the New Village construction (Table 4-14) [82], the structure of the construction plan can be divided into three classifications.

First are the construction initiated by the village committee or the villagers. The pattern of “new house built on former homestead inside Linpan” initiated by the villagers whose houses were damaged or collapsed in Earthquake is known as Mode A. Under this condition, the villagers can keep their homestead and other living spaces and gain subsidies to fun partially of their reconstruction; but the infrastructure inside Linpan were not improved with the integrated plans. Hence Mode A is suitable for the self-initiated reconstruction of homestead in traditional Linpan. While in the case of Mode B, the villagers in Linpan are moved to one place that is planned in integration by the government and built by the village committee or the villagers themselves.

The local government initiates the second type of New Village Construction known as Mode C, with government appointing institutions to plan the construction affairs of new villages and investing for constructions.

The developers initiate the third kind of New Village Construction. If the developers plan and constructed the construction affairs in integration by themselves, it is known as Mode D; but if it is planned by the developers and constructed by the village committee or villagers, it is known as Mode E.

In Mode B, C, D, and E, compared with the original Linpan, the infrastructure in the new villages are improved significantly. In Mode B and C, after the villagers in Linpan are moved in, the original homestead will be available for farmlands. While in Mode D and E, after the villagers are moved in, the original homestead will be utilized by the developer and rearranged of its land use.

Table 4-14 Construction Mode of New Village[1]

Category	Method	infrastructure	Former homestead	Mode
By village committee or farmer	（原址再建） New house built on former homestead inside Linpan	-	Reserved	A
	（统规自建） Plan approved by government, built by village committee or farmer	Advanced	Returned to farmland	B
By Government	（统规统建） Planned and built by government	Advanced	Returned to farmland	C
By developer	（统规统建） Planned and built by developer	Advanced	Land Consolidation	D
	（统规自建） Planned by developer, built by village committee or farmer	Advanced	Land Consolidation	E

[1] Table source: カビリジャン・ウメル (2012)

Table 4-15 Basic Information of 52 New Villages

New Village No.	Perimeter(m)	Area(ha)	Household number	Building area(ha)	Building coverage ratio(%)	Plan type	Mode
1	1256.15	9.30	291	5.24	56.37	3	C
2	764.29	3.12	91	1.63	52.36	3	C
3	634.17	2.45	74	1.34	54.72	3	C
4	376.57	0.75	39	0.36	47.38	2	B
5	318.82	0.68	35	0.31	46.21	2	B
6	451.25	1.10	53	0.48	43.74	2	B
7	438.13	1.20	69	0.62	51.98	3	E
8	601.15	2.12	138	1.24	58.43	2	E
9	613.79	1.36	78	0.70	51.39	2	B
10	485.98	1.32	70	0.63	47.46	1	B
11	757.67	2.90	133	1.59	54.87	3	C
12	766.06	2.68	129	1.55	57.74	1	B
13	516.85	1.74	93	1.11	63.89	1	B
14	610.77	1.99	74	0.89	44.87	1	B
15	911.82	2.50	107	1.28	51.12	2	B
16	973.08	3.84	207	2.49	64.79	3	C
17	877.70	4.42	220	2.64	59.76	3	C
18	677.52	2.72	153	1.83	67.43	3	C
19	794.06	1.87	78	0.93	49.87	2	C
20	512.08	1.54	70	0.84	54.51	3	C
21	498.01	1.54	84	1.01	65.62	2	B
22	473.96	1.15	50	0.59	51.67	2	B
23	560.75	1.35	62	0.74	54.89	3	B
24	941.12	3.69	171	2.05	55.65	2	C
25	996.51	5.69	167	3.00	52.74	3	C
26	479.65	1.27	53	0.63	49.78	1	B
27	606.83	2.08	102	1.22	58.79	3	B
28	502.59	1.43	64	0.77	53.73	3	B
29	800.98	2.48	134	1.61	64.87	3	C
30	579.11	1.62	89	1.07	65.83	2	B
31	468.52	1.22	63	0.76	62.16	1	B
32	568.51	1.79	65	0.78	43.65	1	B
33	841.98	2.45	100	1.19	48.75	3	C
34	635.14	2.42	96	1.16	47.73	3	C
35	739.67	2.69	123	1.47	54.67	2	E
36	965.56	2.84	131	1.57	55.35	3	E
37	839.88	3.10	150	1.80	57.92	2	C
38	771.47	2.19	103	1.24	56.69	3	C
39	712.15	2.10	87	1.04	49.62	3	C
40	1157.46	3.61	169	2.03	56.32	3	E
41	439.23	1.22	52	0.63	51.37	3	B
42	546.57	1.46	79	0.94	64.56	3	B
43	1452.47	5.86	249	2.99	51.06	3	C
44	497.74	1.50	82	0.98	65.20	1	B
45	1269.97	3.89	110	1.76	45.21	3	B
46	474.93	1.42	58	0.69	48.93	2	B
47	709.40	2.04	81	0.97	47.62	1	B
48	1026.70	4.31	192	2.31	53.54	3	D
49	788.20	2.38	111	1.33	55.89	3	C
50	1002.35	4.66	225	2.70	57.92	3	C
51	1077.89	6.75	208	2.49	36.89	3	E
52	1830.90	16.71	497	5.97	35.71	3	E

Table 4-16 Average Value of 52 New Villages

New Village Perimeter(m)	New Village Area(ha)	Household number	Building area(ha)	Building coverage ratio(%)
742.19	2.86	119	1.48	53.83

In these 52 new villages, the average circumference is above 700m and the average area is almost 3ha, which is way beyond the average statistics of traditional Linpan. Due to the concentrated living style, the average household in the new villages is near 120 and the building coverage ratio reaches 53%, which is almost twice bigger than the building coverage ratio of traditional Linpan (35%) in Table 4-8.

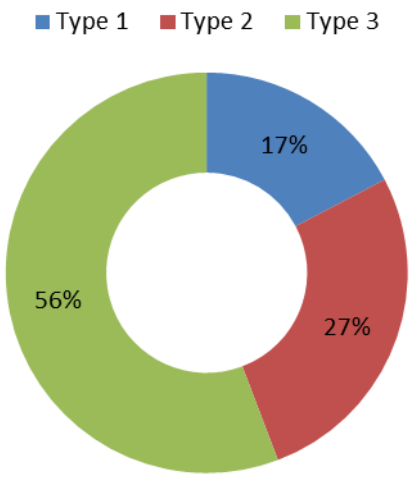


Figure 4-51 Share of Type 1, 2, 3 of 52 New Villages

According to the relation pattern classification of the new villages and traditional Linpan in Figure 4-49，Figure 4-50, 17% out of the 52 new villages belong to Type 1 (building new villages right on the original homestead) and 27% belong to Type 2 (expanding on original homestead) and 56% belong to Type 3 (building new villages on the farmlands between Linpans). This phenomenon explains fully of the government's, the urban planners' and the developers' preference of establishing concentrated communities on the farmlands that requires least effort and with fastest speed in profit negotiation with the villagers since these farmlands are not homesteads, hence no houses need to be removed. For them, economy and efficiency matter most among all considerations.

While according to Table 4-14 that classifies new villages from the aspect of project planners and executors, 46% of the new villages are Mode B (integrated plans by the

government and built by the villagers or villagers' committees), 38% are Mode C (planned and built by the government), only 2% of which are Mode D (planned and built by the developers, and 14% of which are Mode E (planned by the developers and built by the villagers). This phenomenon explains the "integrated plans" are the prerequisite of the New Village Construction Movement and that the planners need to consider not only the improvement of infrastructures, but also a building layout that will satisfy the need of as many villagers as possible based on the understanding of the production lifestyles of the rural area and the exchange of opinions with the villagers. These aspects of considerations will be huge challenges for the "integrated plans".

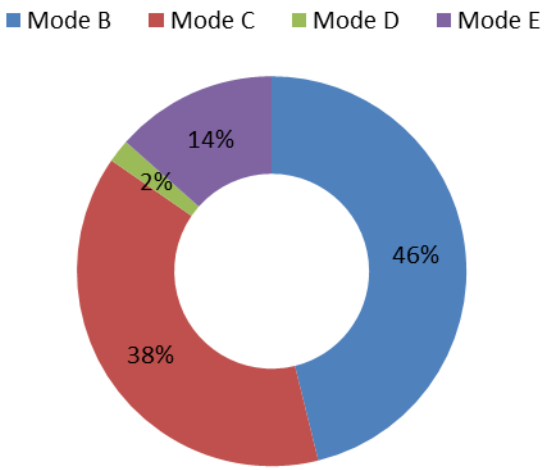


Figure 4-52 Share of Mode B, C, D, E of 52 New Villages[1]

Also, among these Modes (Table 4-17), those new villages belonging to Mode B have the least average area around 1.6ha, which is basically a bigger Linpan twice the size of traditional Linpan (0.83ha) in Table 4-4 with average households at around 70. While in the case of Mode C, D and E, since they are integrated planned by the government or the developers, the average area reach around 3.5-5ha, which is a lot bigger than the size of traditional Linpan. In addition, the households in new villages reach 150-200, which is a new record of household density compared to the average households in traditional Linpan (Table 4-7, Table 4-8).

[1] In Mode A, farmers rebuild their houses affected by earthquake in their original residential foundation in traditional linpan. Therefore Mode A is not a case of New Village.

Table 4-17 Average Household Number Sorted by Mode

	Mode B	Mode C	Mode D	Mode E
Average Area(ha)	1.63	3.46	4.31	5.13
Average Household number	74	145	192	191

Since "high population but few farmlands" is the general fact in China, the relative regulations on lands such as the Land Administration Law of the PRC[1] [83], the Regulations on the Preservation of Basic Farmlands[2] [84], the New Rural Construction and Planning Guides of Chengdu [85], and the Land Use Plan of Dujiangyan (2006-2020) [86] all require local governments to strengthen the preservation of farmlands such as controlling the decrease and increasing the area. The preservation of farmlands is also listed among the performance assessment of the government leader.

From the condition of Dujiangyan City, with the development of urbanization, the expansion of the urban area will certainly lead to the decrease of farmlands. As a result, it is necessary to properly increase the area of farmlands to maintain the quantity. Via the New Village Construction movement, villagers scattering among Linpans are gathered and the homestead and other living spaces in original Linpan are no longer used for their original purpose and changed to farmlands. This rearrangement of the lands basically helps to maintain the quantity of farmlands lost due to urbanization[3]. Therefore via the land arrangement of the New Village Construction movement after the Earthquake, more spaces are made available for the development of urban areas. The villagers can obtain certain degree of economic subsidies but the original production and living spaces are significantly decreased.

Therefore, in the government and developer planned Mode C, D, and E, rural communities that can accommodate more villagers are established to decrease the investment in infrastructures and to obtain the greater economic benefit from the development of commodity residences due to more lands gained; but this increase of interest is basically unavailable for the villagers. This style of land arrangement is

[1] Decision made by the Sixteenth session of the Sixth National People's Congress on June, 25, 1986, which was further amended in 1998 and 2004.

[2] The Regulations on The Preservation of Basic Farmland was promulgated by the State Council of the People's Republic of China on December 24, 1998 and enacted since January 1, 1999.

[3] This approach of managing the lands was known during interviews with the leader of the Chengdu Planning and Management Bureau and villagers in the New Villages.

very common in the New Village Construction Movement of other areas in China [87], gaining profits from the sacrifice of the villagers' interests [88].

From Table 4-18 and Figure 4-53, it is found that Type 1 (building houses and rearranging the construction layout based on the original Linpan and increase the building density) exists only in Mode B (integrated plans and built by the villagers themselves) and there are 9 spots of new villages built in this way. Also, Type 2 (expanding a bit based on the original Linpan) exists most in Mode B, reaching 9 spots as well.

While in the cases of government- or developers-initiated Mode C, D, and E, they are consisting of mostly Type 3 (construction on farmlands between original Linpans), reaching 23 spots (with the new village shown in Figure 4-54 as example); while only 5 spots of Type 2.

Table 4-18 Classification of 52 New Villages by Type and Mode

	Mode B	Mode C	Mode D	Mode E
Type 1	9	0	0	0
Type 2	9	3	0	2
Type 3	6	17	1	5

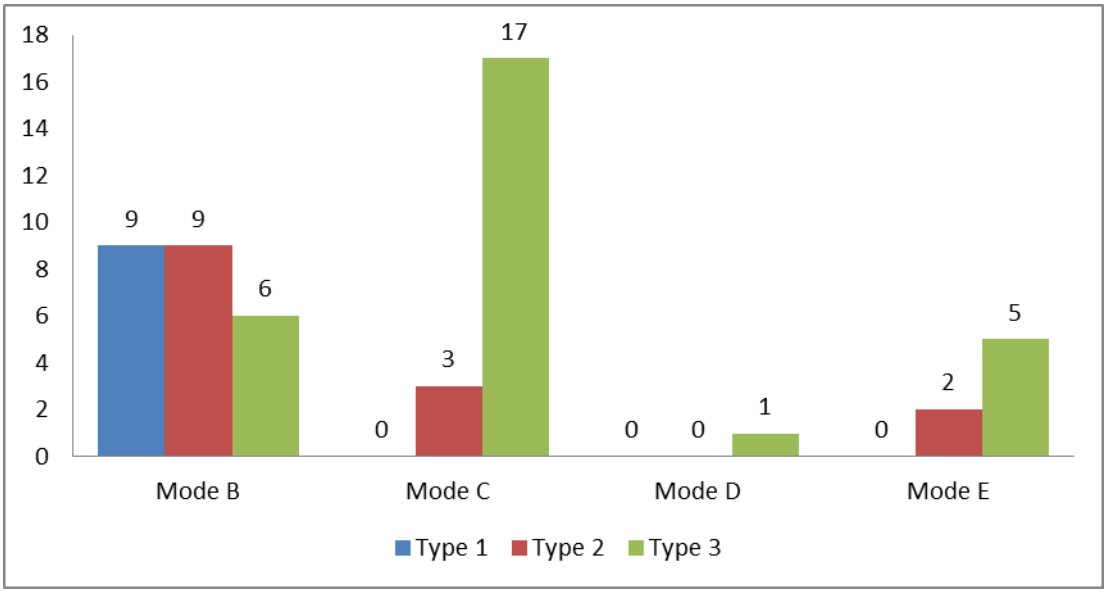


Figure 4-53 Classification of 52 New Villages by Type and Mode

Therefore, as in Table 4-14, if Mode A, which enables Linpan villagers to rebuild houses right on the spot of the collapsed houses due to the earthquake, is the ideal way to preserve the traditional cultural landscape of Lipan, under the condition that new villages must be built for the concentrated settlement of the villagers from original

Linpans, Mode B will be the most efficient way to maintain the homestead of original Linpan and to preserve the traditional rural cultural landscape structure. Also, since the free spaces in front of and behind the houses in Type 1 and 2 are much more, the villagers can have better chances to decrease the living costs by using these spaces for planting fruits and vegetables; hence indeed the better way to maintain traditional lifestyles and to ensure the interests of the villagers.

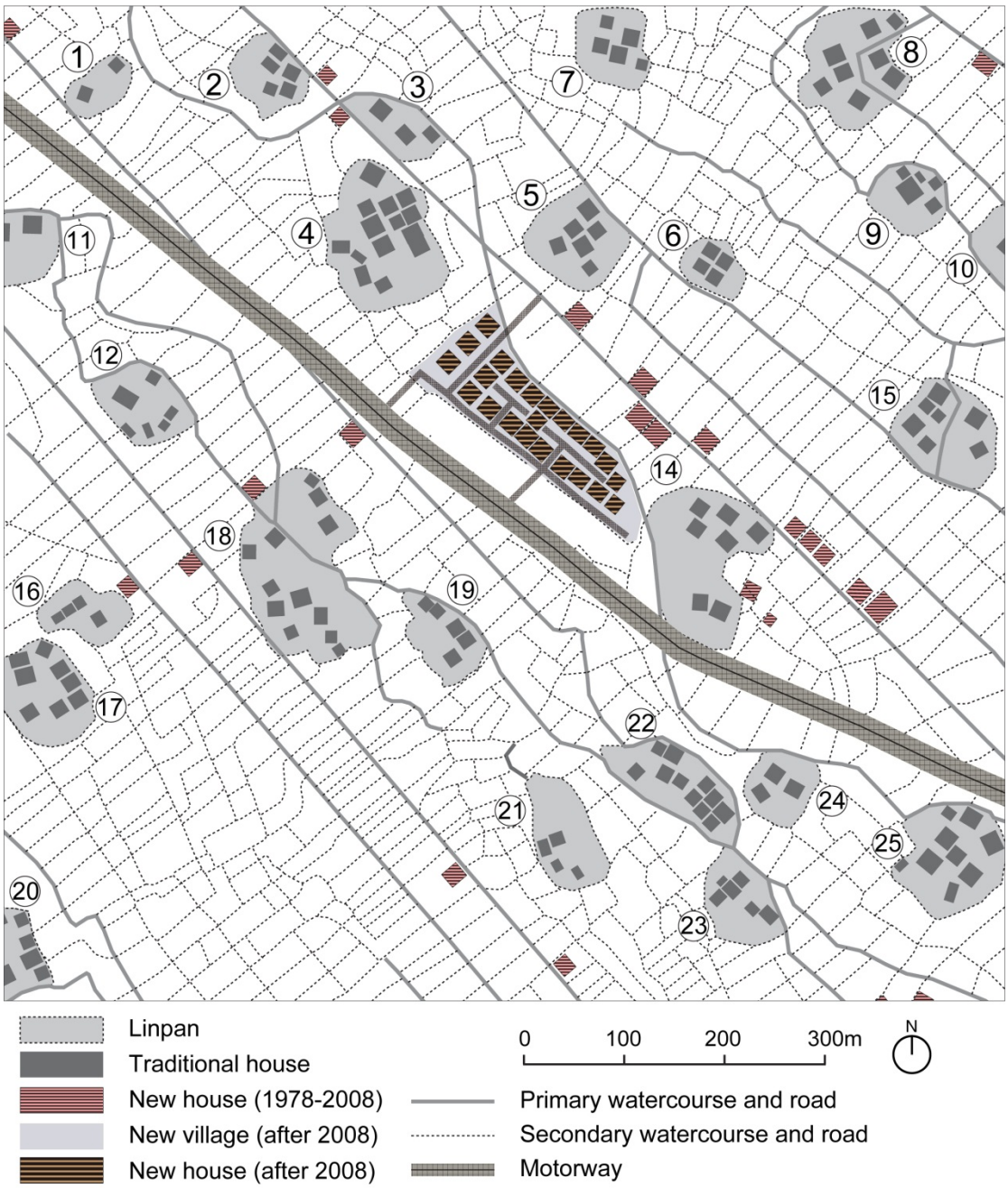


Figure 4-54 Land Use in Mesh K・6 (2012)

4.5.2.2 Architecture Characteristic in New Village

According to the plans of the government, the average living space of each person in the new communities is 30 square meter, hence the residential lands are lessened compared to that before the earthquake. The building patterns are designed by the architecture firms appointed by the government and compared to the traditional L or U shaped planes, the new building planes are mostly in squares and the houses join one another in rows without large courtyards. Only a small portion of building designs of the new rural communities can maintain the traditional characteristics of the buildings under the floor area ratio set by the government. These buildings with traditional characteristics have small courtyards in the front to fulfill the daily needs of the residents.

Also, the height of buildings is increased significantly. Usually the traditional houses are one-floored buildings but those in the new rural communities are usually two-floored and some are three-floored to reach the goal of using smaller area to house more people. The building materials are similar to those in urban area with the exterior walls painted with eye-catching colors

Figure 4-55 Image of New Village No.38 in Mesh K • 6

4.5.2.3 Improvement of Infrastructure inside New Village

Except for the change on the layout of building planes, the infrastructure of the new rural communities received significant improvement. In addition to the electric networks and tap water pipes that are already available among rural areas, the natural gas pipes, cable networks and the high-speed fiber optic Internet networks are also brought into the communities. With electricity and gas as energy, traditional biofuel for cooking such as firewood and straws are no longer needed, hence the cease of utilization of plants.

The greening within the communities is also planned. Green spaces and trees planted

are planned on both sides of the roads and around the buildings. Also, the roads in the communities are widened and paved with concrete for the convenience of vehicle driving.

4.5.2.4 Appearance of Ecological Linpan

With the principle of the aforesaid three types of construction methods of new rural communities being the concentration of residents, the farmlands that used to be Linpans surrounding the new communities became the habitat for birds and animals due to the forests being uninhabited. Compared to the significance of living cultures, these hollowed Linpans have better significance in ecology. According to an interview on a leader of the planning division of the local government, it is a consensus that the hollowed Linpans where the forests are located will be preserved as Ecological Linpan

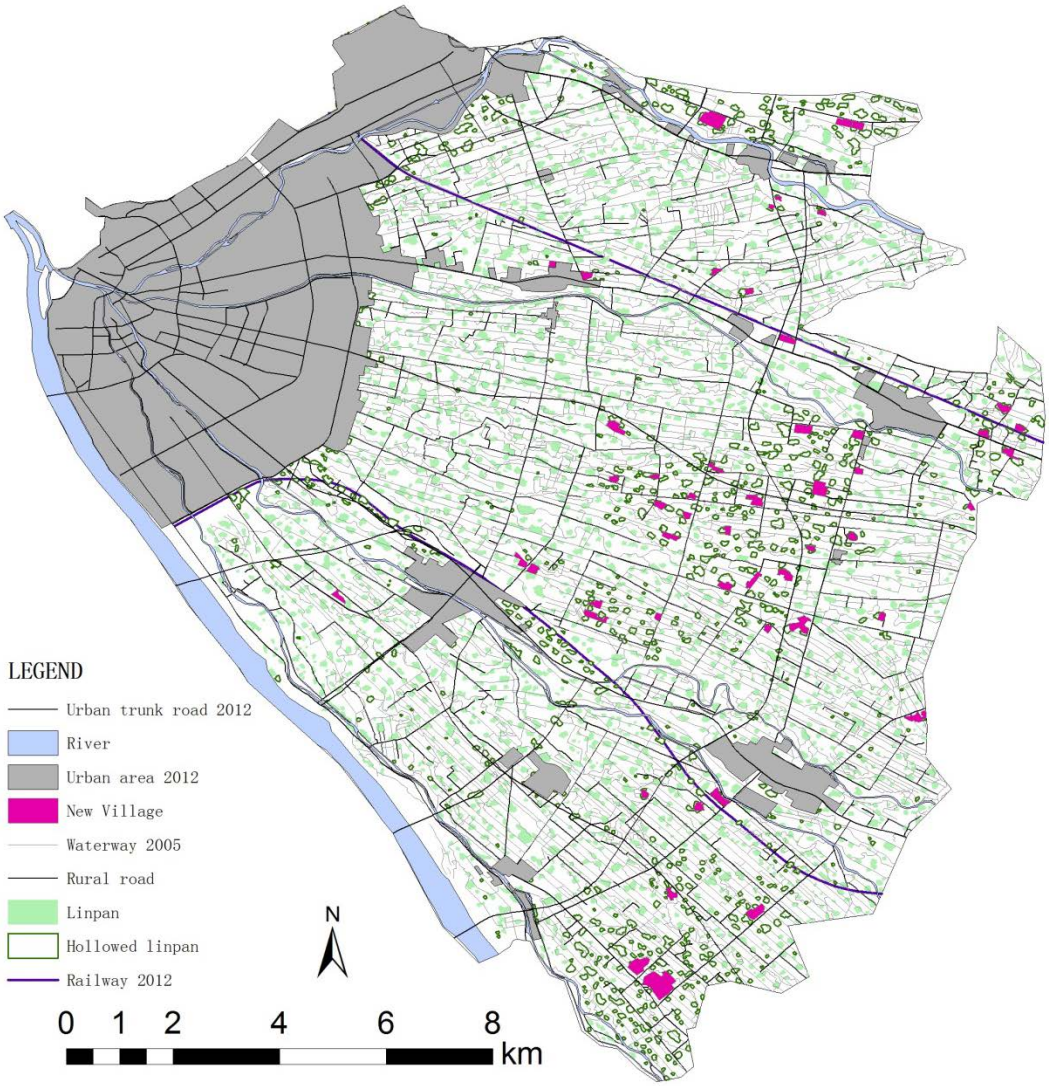


Figure 4-56 New Village Surrounded by Ecological (Hollowed) Linpan

4.5.3 Agricultural Land

Concerning the management of farmlands, the scale of orchards planting fruits of higher economic value and nurseries planting ornamental seedlings is expanding.

4.5.3.1 Fast Expansion of Ornamental Plants' Nursery

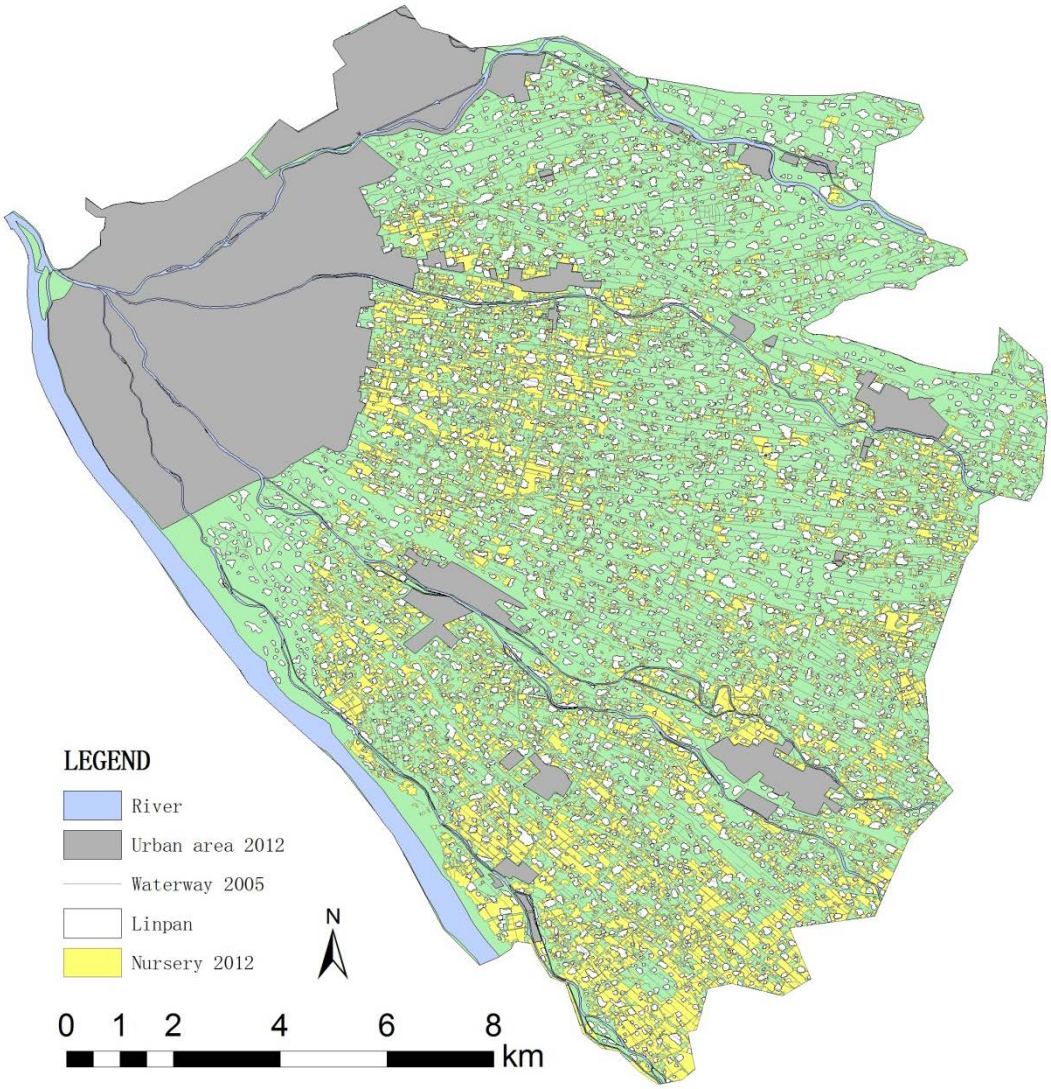


Figure 4-57 Distribution of Ornamental Plants' Nursery in 2012

After the earthquake in 2008, the post-earthquake reconstructions of the urban and rural areas in the Chengdu City metropolitan area in working led to the high demand for greening trees. As the economic benefit of planting flowers and trees is way higher than that of planting traditional crops, the cultivation of ornamental flowers and trees nurseries spreads rapidly on the alluvial plain of Dujiangyan City (Figure 4-57). With their fine industrial scale, the production and marketing structure is thus formed.

In the species of seedlings in the nurseries, *Ginkgo biloba* and *Osmanthus fragrans* are primary species of arbors planted. These arbors with height around 3-5m are widely planted making the traditional crop-based landscape changing to forests.

Table 4-19 Nursery Area Measurement in 2012

Item	Area (km^2)
Fan-shape area	197.80
Urbanized Area（2012）	39.23
Artificial Canals	3.13
Natural River (Minjiang River)	5.28
Crop and Vegetable Field	92.09
Linpan	25.19
Nursery	32.88

4.5.3.2 Corporate-Scaled Operation of the Agricultural Products

Since 2008, the modernization of agriculture also becomes one of the goals in the New Village Construction Movement. One of the characteristics of the modernization of agriculture is the professional management of concentrating farmlands to corporations specialized in this field to organize larger scale of production. After the farmers contract out their farmlands to the agriculture companies, they can receive economic benefits periodically. Also, since the companies are hiring workforces for farming, the identity of farmers is changed to industrial labors. The farmers can no longer do the farm works directed on their lands, hence more workforce are released to urban areas

The industrialized agriculture companies operate the planting and marketing of crops, vegetables and fruits. While in the case of seedlings in the nurseries, the planting, management and the marketing are mostly done by professional gardening and greening companies. This kind of specialized planting pattern enables a massive increase in labor efficiency and a closer economic relation to the urban areas due to the primary market being cities. As a result, the traditional self-sufficient production is no longer among options for the villagers in rural areas.

Also, the operation with large scale requires the merging of lands. As a result, larger scale of land arrangement and demarcation of field grids are in progress.

4.5.4 Watercourses and Road System

Since 2008, the land arrangement and demarcation of field grids resulted from the scaled planting in New Village Construction Movement leads to the reorganization of some of the secondary watercourses. But the road network for vehicles in rural areas

is completed.

4.5.4.1 Watercourse Reorganization

In the farmlands, though it is common that there are changes of tiny canals due to the rearrangement of the field grids, the distribution and direction of the main irrigation canals as shown in Figure 4-38 are not influenced. But with the widening and reinforcement of the irrigation canals and the common techniques of paving concrete on walls and the bottom of the canals, the root system of trees are no longer needed for holding the soil, hence the decrease of trees along the canals

Because of the construction of new rural communities will take up spaces in the farmlands, the tiny irrigation canals in those areas will be reorganized. While in the case of the primary irrigation system on the original farmlands (Figure 4-38), they are preserved and become part of the landscape of new rural communities. Also, the construction of new rural communities did not influence any part of the irrigation of farms downstream

4.5.4.2 Modern Transportation and Road System Enhancement

After the flourished development of the agriculture industrialization, the transportation of agricultural products is flourished as well. Also, since the workforce from rural areas needs vehicles to commute to work and the emergence of rural tourism attracts more and more urban citizens to have fun in rural areas via self-driving trips, the need for more convenient transportation of people and resources between cities and rural areas is therefore increased and serves to the better development of road systems especially in rural areas. It is therefore a mutual consensus of the government and the people that “to acquire wealth, best start from building roads”

With years of effort, the high speed rail, goods rails, highways, main roads that connect Dujiangyan City with other cities, and the vehicle roads in rural areas together constitute the modern transportation network covering the alluvial pain of Dujiangyan. Especially the coverage of rural roads that villagers use for driving out has reached every corner of the villages.

As the widening and paving of concrete of roads for vehicles in rural areas were completed, root systems of trees are basically unnecessary for holding the foundation

of the roads, hence no new street trees were planted along both sides of the roads after they were chopped off during the renewal. This phenomenon leads to the disappearance of tree landscapes along the primary roads in rural areas

4.6 Summary

The Rural Cultural landscape on alluvial plain in Dujiangyan city could be defined as "Agroforestry system and its surrounding agricultural landscape based on the World Heritage Dujiangyan irrigation waterway system. This traditional system has the flexibility in adaption to dynamic changes of modernization, while having active social role. The combination of Linpans produce evolutionary infrastructure in regional sustainability, such as ecological, recreational, economical aspects, and the evolution is still in progress".

This chapter divides the socioeconomic development of the rural areas in Dujiangyan City into three phases—the Traditional Agrarian Era (before 1978), the Early Modernization Era (1978-2008) and the Mid-Modernization (Post-Earthquake) Era (after 2008). With this line of thinking, this chapter also gives further analysis on the characteristics and transitions of elements that construct the rural cultural landscape and lifestyles of the villagers in selected alluvial fan plain area of Dujiangyan

In Traditional Agrarian Era, Linpan is the smallest unit of rural community. The building arrangement within Linpan reflects fully of the patrilineal society characteristics and the room layout in the building demonstrates the hierarchic order of the Confucianism that respect highly of the elders. The buildings surround large courtyards and formed L or U shaped plane layout. The courtyards have multiple functions and are the center of daily lives of the villagers. The woods in Linpans are the materials for house building, farm tools and fuels; the forests are also places for livestock farming as well. The primary agricultural production of the farmlands is crops. The irrigation system and the road system are in highly overlapped and forming tree bands along the canals.

In Early Modernization Era, with the economic development and the increase of income, the materials for house building within Linpans are renewed but the basic layout of the buildings are not changed. Also, as the younger generation moves out for work, the hollowing of Linpans emerges. The change on the building materials and

usage of fuels lowers the dependency of villagers on forests. Also, with the field grid arrangement in progress, nurseries for cultivating ornamental trees emerge. The renewal of roads and canals also leads to the disappearance of banding tree landscapes.

When it comes to Mid-Modernization Era, government-initiated plans and design on new rural communities makes the victims to live in concentrated residential areas. As the fundamental infrastructure received great improvement, the modernized lifestyle that is no different from that of the urban areas gradually replaces the traditional agrarian lifestyle. The coverage of trees in new rural communities is significantly lowered. Also, the production and marketing of agricultural products such as vegetables, fruits and seedlings that are led by professional agriculture companies and gardening firms start to demonstrate characteristics of scaled industrialization. Further, the construction of new rural communities respectfully of the original distribution and direction of irrigation canals but with the widening and reinforcement works of the roads and canals, the banding tree landscape along these lines are nearly gone.

Chapter 5

Analysis of Relationship between Human Activities and Rural Cultural Landscape Change on Alluvial Plain of Dujiangyan City

Chapter 5. Analysis of Relationship between Human Activities and Rural Cultural Landscape Change on Alluvial Plain of Dujiangyan City

5.1 Introduction

In previous chapter, the transition and lifestyles of people in the alluvial plain of Dujiangyan City is discussed in detail according to three time frames. Following this line of thinking, the characteristics and transition of rural cultural landscapes will thus be covered in this section. It is known that the formation of rural landscapes is highly related to the lifestyle and culture of the rural villagers. Since the daily necessities of the people including eating, clothing, living and traveling all require a space for these activities to perform, these spaces for particular focus thus constitute each landscapes. In this definition, landscape can be regarded as interpretable text and its variation will also reflect the changes of the rural culture.

5.2 The Continuity of Traditions via Culture and Landscapes

From the traditional daily activities (culture) of the villagers, these activities can be divided into housing, production and resource exchange. The following discussion will be based on the aforesaid classifications to focus on their influence on the continual of traditions in Early Modernization Era and Mid-Modernization Era.

5.2.1 Early Modernization Era (1978-2008)

Firstly, no changes are found on the irrigation system and methods for irrigation in this era. Second, though there are newly built or reformed houses in Linpans, the family unit that serves to construct the structure of Linpan did not change. Also, the practice and operation works of the agroforestry system in Linpans are succeeded well.

In the housing classification, the building layout in either L or U shaped pattern that surrounds a large courtyard is determined by the patrilineal tradition in traditional agrarian era, the gathering of big family, the need for communication between family members, the making of handiworks, the sundry works for the crop, firewood and clothes, etc. In this period of time, the traditional lifestyles of Lipan are inherited.

From the classification of production, the tradition of planting various arbors and bushes in open spaces in front of and behind the house remains unchanged. Also, the main production of the crops, vegetables and fruits requires not only large spaces but also the irrigation system to adjust the water amount. Hence the large scaled farmlands and the irrigation system that is densely distributed as spider web are also inherited.

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5.2.2 Mid-Modernization Era (after 2008)

In terms of housing, the basic unit that constitutes the rural area is still the villages and the property of the villages in those new rural communities is not changed.

Concerning the production, the production of spaces in front of and behind the houses in new rural communities is still functioning. Hence the area of lands and the range for farming is succeeded and the irrigation system accompanied is reinforced too.

While in the case of resource exchange, in Mid-Modernization Era, the road system in rural areas are widened and reinforced with solid materials.

5.3 Transitions of Culture and Landscapes in Modernization Context

Among the landscape classifications that continuously evolve with time such as the rural landscape, the change in characteristics is and always will be the theme in this field. Different cultures in different eras will lead to transitions of landscapes. The changes of culture and landscapes during early and mid-modernization are as following.

5.3.1 Early Modernization Era (1978-2008)

In housing classification, the layout of buildings still remains traditional but the techniques and materials of construction are improved.

In terms of production, with the change of construction materials for buildings, the villagers' dependency on the forest in Linpan is decreased. However, though the landscape of these forests did not change, the function did, since the arbors and bushes of various species in the Linpan forests are used as raw materials for selling to papermaking and furniture companies. In addition to the traditional production of crops, vegetables and fruits, the nursery of seedling becomes new options for the diverse management of agriculture. Also, though the materials paved on the walls of the irrigation system are changed, the banding forest landscape starts to disappear as well.

From the resource exchange, the traditional self-sufficient lifestyle is no longer in function and the interaction between villagers and the market is much closer. Hence during the progress of widening and reinforcement of the roads, the street trees landscape starts to disappear.

5.3.2 Mid-Modernization Era (after 2008)

In housing classification, the plans for the new rural communities are no longer decided by the villagers but by the government. The house layout in the new rural communities is no longer related to the traditional patriarchal clan conventions and with the shrinking of house size, the habit of living with the big family is no longer in practice.

From the production classification, the trees in new rural communities are shared properties; hence no private trading of these trees is allowed. The nurseries of ornamental seedlings and the production of kiwifruits together form the scaled industrialization of the local production. With the lands are contracted out to private agricultural corporations, the farmers are hired again as industry workers. Also, as the reinforcement of the irrigation canals is accomplished, the banding tree landscapes along these canals are basically gone.

While from the aspect of resource exchange, the agricultural production is highly related to the market demands, rural supplies and the urban requirements. As for roads in rural areas are in hierarchic system that has almost no banding tree landscapes left.

Table 5-1 Summary of Human Activity Change in Three Eras

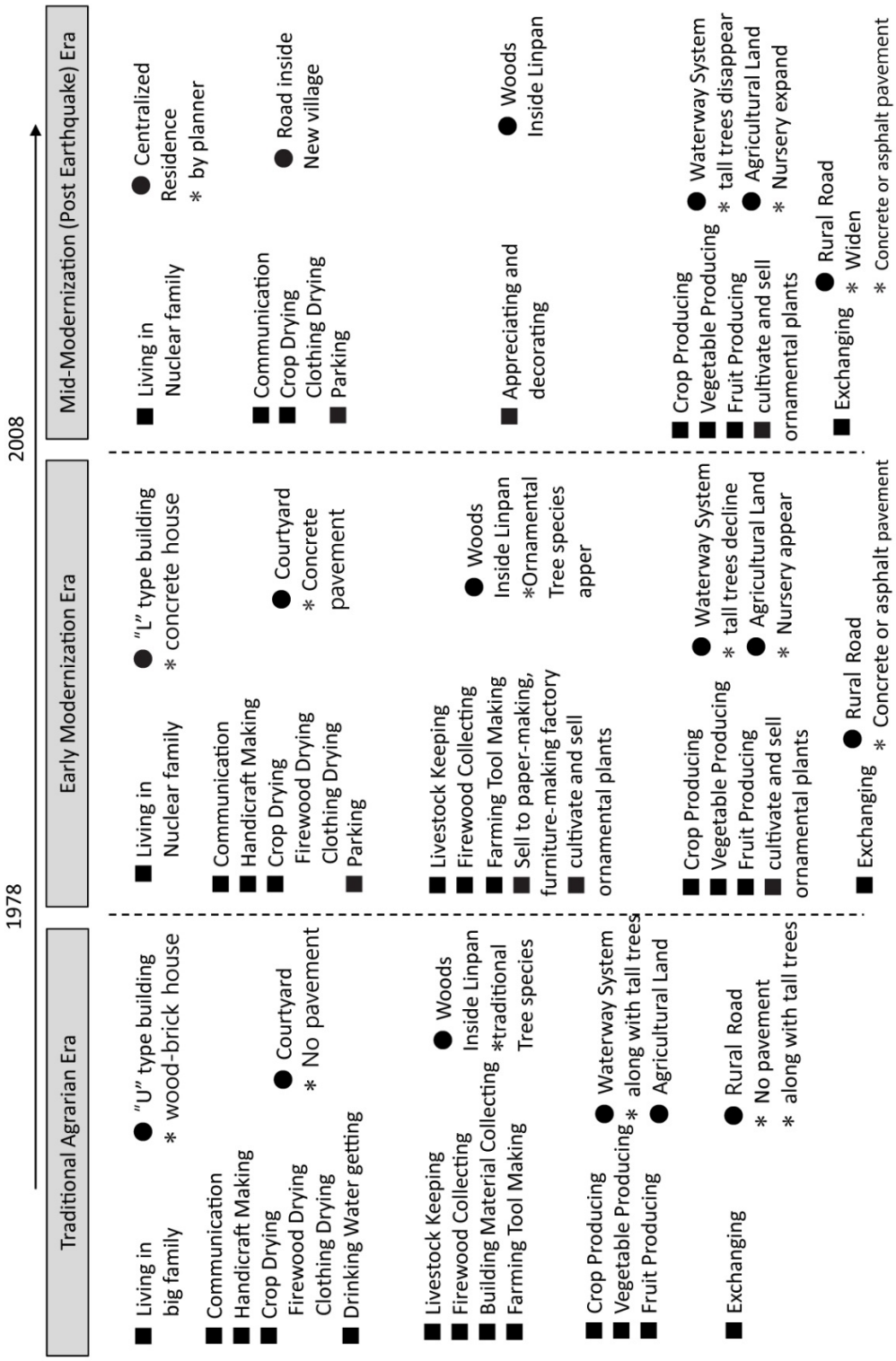


Table 5-2 Relationship between Human Activities and Landscape in Traditional Era

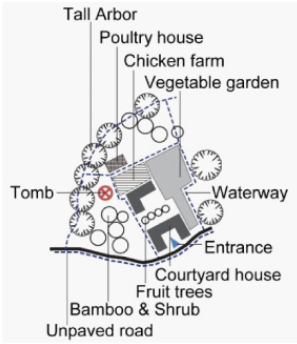
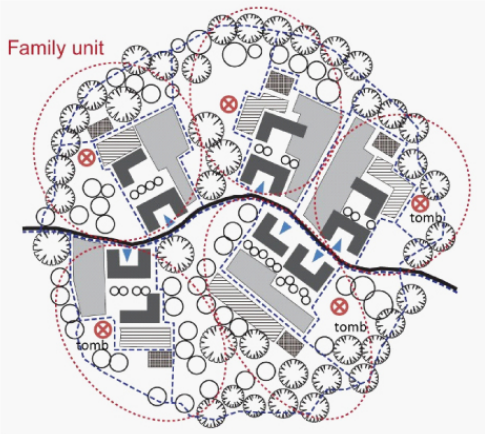
Agent	Medium	Result	
Cultural elements	Natural elements	Cultural landscape elements →	Cultural landscape
■ Living in big family	●land	● "U" type building * wood-brick house	structure of Linpan area
■ Communication ■ Handicraft Making ■ Crop Drying Firewood Drying Clothing Drying ■ Drinking Water getting	●land ●water	● Courtyard * No pavement	
■ Livestock Keeping ■ Firewood Collecting ■ Building Material Collecting ■ Farming Tool Making	●land ●water ●Arbor species ●Shrub species	● Woods Inside Linpan *traditional Tree species	
■ Crop Producing ■ Vegetable Producing ■ Fruit Producing	●land ●water ●Crop species ●Vegetable species ●Fruit species	● Waterway System * along with tall trees ● Agricultural Land	
■ Exchanging	●land	● Rural Road * No pavement * along with tall trees	

Table 5-3 Relationship between Human Activities and landscape in Early-Modernization Era

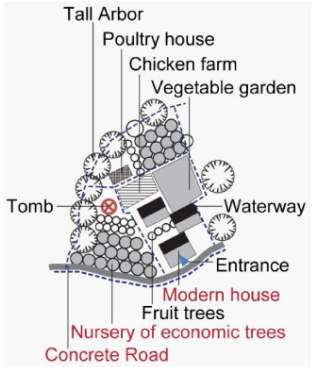
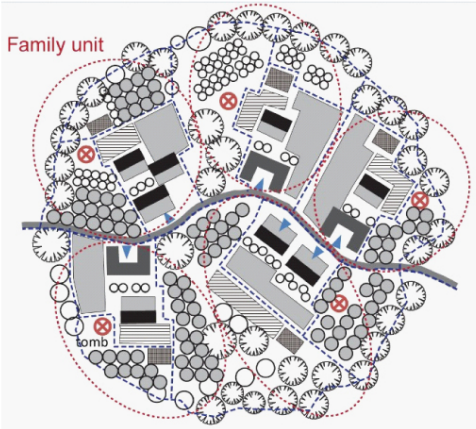
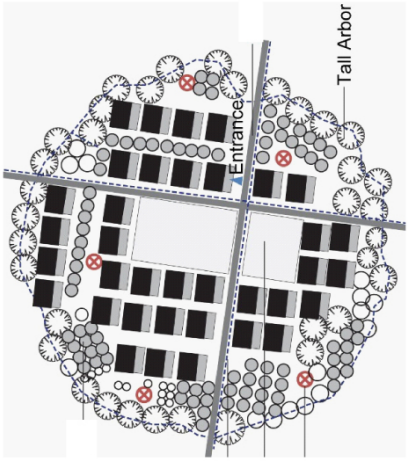
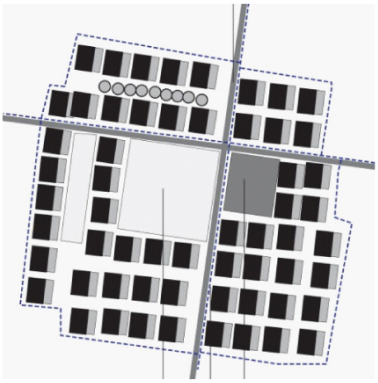
Agent	Medium	Result	
Cultural elements	Natural elements	Cultural landscape elements →	Cultural landscape
■ Living in Nuclear Family	●land	● "L" type building ＊ concrete house	
■ Communication ■ Handicraft Making ■ Crop Drying Firewood Drying Clothing Drying ■ Parking	●land	● Courtyard ＊ Concrete pavement	
■ Livestock Keeping ■ Firewood Collecting ■ Farming Tool Making ■ Sell to paper-making, furniture-making factory ■ cultivate and sell ornamental plants	●land ●water ●Arbor species ●Shrub species	● Woods Inside Linpan *Ornamental Tree species appear	
■ Crop Producing ■ Vegetable Producing ■ Fruit Producing ■ cultivate and sell ornamental plants	●land ●water ●Crop species ●Vegetable species ●Fruit species	● Waterway System ＊ wayside trees decline ● Agricultural Land ＊ Nursery appear	
■ Exchanging	●land	● Rural Road ＊ Concrete or asphalt pavement ＊ wayside trees decline	

Table 5-4 Relationship between Human Activities and Landscape in Post-Earthquake Era

Agent	Medium	Result
Cultural elements	Natural elements	Cultural landscape elements → Cultural landscape
■ Living in Nuclear Family	● land	● Centralized Residence * by planner
■ Communication ■ Crop Drying Clothing Drying ■ Parking	● land	● Road inside New village
■ Appreciating and decorating	● land ● water ● Arbor species ● Shrub species	● Woods Inside Linpan
■ Crop Producing ■ Vegetable Producing ■ Fruit Producing ■ cultivate and sell ornamental plants	● land ● water ● Crop species ● Vegetable species ● Fruit species	● Waterway System * tall trees disappear ● Agricultural Land * Nursery expand
■ Exchanging	● land	● Rural Road * Widen * Concrete pavement * tall trees disappear





5.4 Attitudinal Differences of the Villagers towards Transitions

5.4.1 Transitions of Rural Cultural Landscape

First, based the aforesaid analysis, the transition scale of the landscape elements can be divided into four classifications including “most easily changed”, “easily changed”, “hard to change”, and “very hard to change”. The following will explain the degree of difficulties of changes of each landscape elements of Linpan during Early Modernization Era and Mid-Modernization Era respectively.

Table 5-5 Evaluation of Landscape Components Change in Modernization Era

Early Modernization Era (1978-2008)						
Item			**Most easily changed**	**Easily changed**	**Hard to Change**	**Very hard to change**
Rural Community (Linpan)	Rural Community Structure					●
	Architecture Style	Building Material		●		
		Room Arrangement			●	
	Courtyard					●
	Cemetery					●
	Woods Around House	Arbor			●	
		Shrub	●			
Waterway System	Woods along Waterway	Arbor			●	
		Shrub	●			
	Waterway Organization				●	
Agricultural Land	Crop Species					●
	Ornamental Plant Species in Nursery			●		
	Field block				●	
Road System	Woods along Road			●		
	Road Organization				●	

In Early Modernization Era (1978-2008), without the coercion of the government to change the formation of housing, the building layout in Linpan, the courtyard and the interior room layout of the buildings are not easy to be changed. It is also not common that the arbors, cemetery, irrigation canals, road systems, field blocks and the crop

species in farmlands be changed.

In comparison, the villagers usually change building materials that are much easier to receive changes to cheaper and cozier building materials available in this era. Hence since 1978, ferroconcrete buildings gradually replaced traditional wooden structure buildings and became the major building pattern. Also the bushes along both sides of the roads and those in Linpan are easy to be removed or replaced with other species of trees.

Table 5-6 Evaluation of Landscape Components Change in Post-Earthquake Era

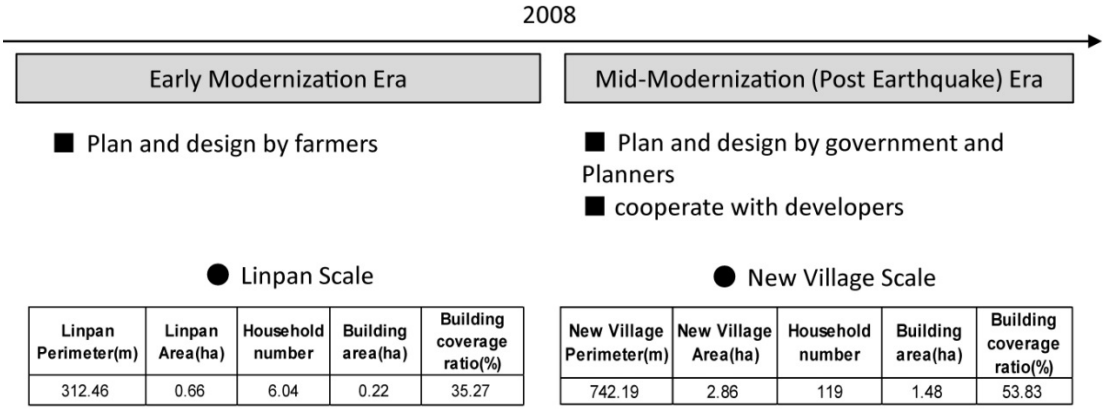
Mid-Modernization (Post Earthquake) Era (After 2008)						
Item			**Most easily changed**	**Easily changed**	**Hard to Change**	**Very hard to change**
Rural Community (Linpan)	Rural Community Structure		●			
	Architecture Style	Building Material	●			
		Room Arrangement	●			
	Courtyard		●			
	Cemetery					●
	Woods Around House	Arbor			●	
		Shrub	●			
Waterway System	Woods along Waterway	Arbor		●		
		Shrub	●			
	Waterway Organization				●	
Agricultural Land	Crop Species					●
	Ornamental Plant Species in Nursery			●		
	Field block				●	
Road System	Woods along Road			●		
	Road Organization				●	

Whereas in Mid-Modernization Era (after 2008), with the government's coercion, the building formation, styles, room layout and plant species in nurseries are easy to be changed. As a result, it is found that the methods for constructing new rural communities have the greatest impact on the buildings and thus the newly built buildings receive greatest challenges in inheriting the traditional characteristics of buildings in Linpan.

However, what are not easy to be changed are the large arbors on the original Linpans,

the irrigation system, the road system and the organization of field blocks.

Table 5-7 Scale of Traditional Linpan versus New Village



Linpan Perimeter(m)	Linpan Area(ha)	Household number	Building area(ha)	Building coverage ratio(%)
312.46	0.66	6.04	0.22	35.27

New Village Perimeter(m)	New Village Area(ha)	Household number	Building area(ha)	Building coverage ratio(%)
742.19	2.86	119	1.48	53.83

Among these transitions, the New Village Construction Movement enacted after the Earthquake had most influence on the changes of lifestyles of villagers. First, for traditional Linpan, it is found that most of which were at the scale smaller than 1ha and with circumference around 300m. However, in those 52 new villages on the fan-shape area, the average circumference of the villages exceeds 700m and average area around 3ha, which is a lot bigger than the average size of traditional Linpan.

The new villages did not only expand in size, but also in the density of population. In traditional Linpan, die to the limitation of agricultural production, households in Linpan were impossible to expand unlimitedly. Hence most of the traditional Linpans had no more than 10 households each. However, in new villages, with the change of building styles that enabled a large amount of residents living in a concentrated place, the average households in each of those new villages exceeds 100 households. Also, the coverage ratio of buildings has been raised from 35% on averages in traditional Linpans to 53% in new villages, which is twice density.

5.4.2 Villagers' Attitudes towards New Villages

The most distinguished change in new villages will be the massive improvement of the infrastructure qualities. The villages can have access to pipe gas, water, cables, Internet and sewage treatment are also done in an organized manner. With the improvement of life quality [1], villagers who reported experienced massive

[1] There were 237 villagers from 52 new villages in our survey. The survey time was September 25th and October 20th of 2010.

improvement of life quality reach 91% and those who considered the improvement were not as impressive also took up 8%. Hence generally the villagers were satisfied with the improvement of daily infrastructures and their life quality that can now be compared to that in urban areas (Figure 5-1).

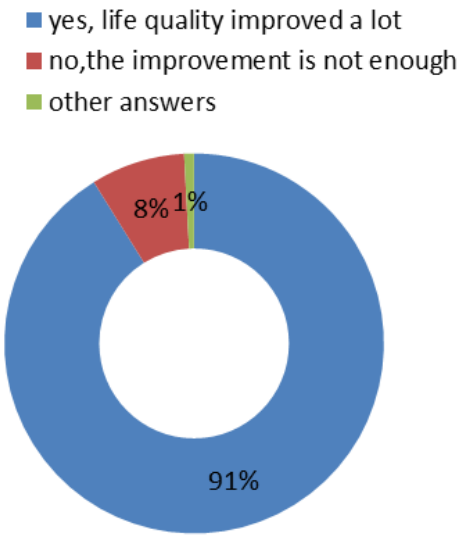


Figure 5-1 The Villagers' Satisfaction of Infrastructures

Problems thus arose will be the fact that all of these public infrastructures do not come for free. Compared with the situation in traditional Linpan that took the improvement of facilities with serious consideration of the financial capability of each household, the living expense nowadays has increased significantly. With no significant increase in the income, the increase of life expense also increases the financial burden of the villagers.

In addition, on account of the lack of spaces for villagers to keep their livestock or to plant trees or vegetables of economic benefits in the planning of new villages, the agroforestry system that used to be the resource of income are now unavailable, hence cause the primary dissatisfaction of the villagers. With the survey in this study, it is found that the 28% of villagers feel most dissatisfied with the shrinking of living spaces compared to the original Linpan, 33% feel most dissatisfied with the increase of life expense due to the modern infrastructures, and another 36% of the villagers feel most dissatisfied with the lack of space for planting vegetables or keeping livestock (Figure 5-2). In other words, villagers who feel dissatisfied due to the fact that traditional ways of production in original Linpan are no longer available and thus

lead to the decrease of family income are in fact 69%. Compared with the shrinking of living spaces that can be endured by the villagers, the economic deficiency of the new villages becomes new problems put to the villagers.

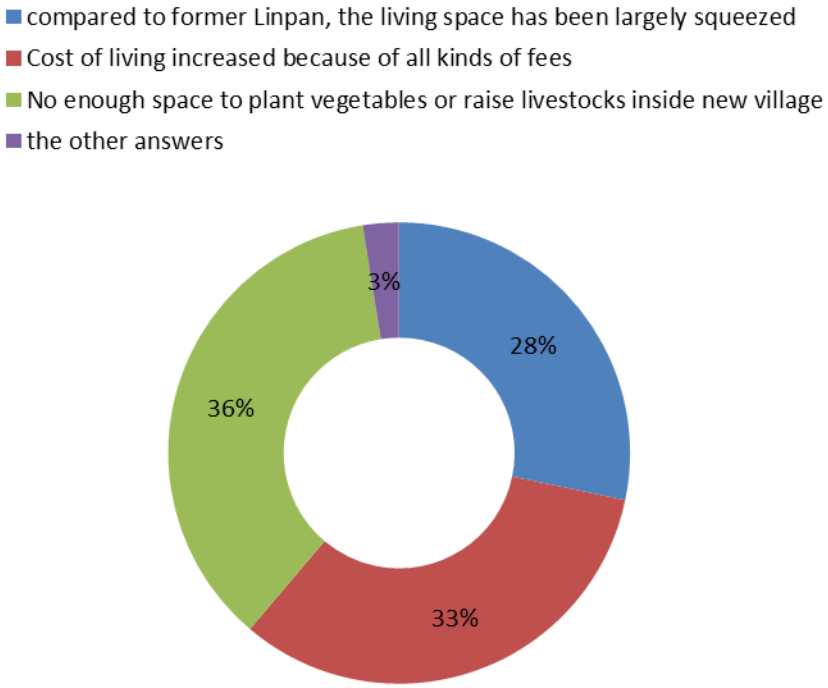


Figure 5-2 Items of Dissatisfactory on New Villages from the Villagers

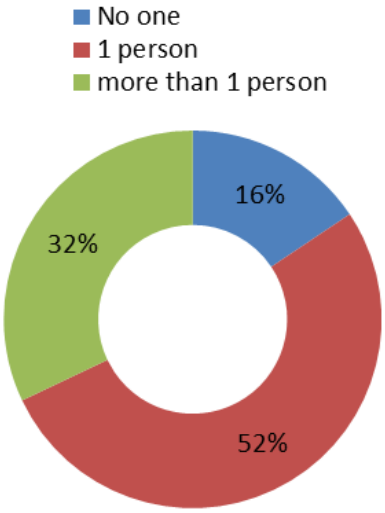


Figure 5-3 Share of Migrant Worker Number in One Family inside New Village

As shown in above, the traditional lifestyles of the villagers have been forced to change with the set patterns of the new villages. With the production style in traditional Linpan being no longer available, the villagers can no longer depend solely

on the agricultural income; hence working part-time in the cities becomes the only way to increase income to support the family.

In the survey, it is found that only 16% of the villagers in the new villages do not need to work in cities to maintain their lives. However, 52% of the families must have at least one family member working in cities to support the family and 32% of which have more than one family members working in the cities to support their families (Figure 5-3).

With the aforesaid analysis, the mutation of economy of urban and rural areas is indeed the most significant change after the Earthquake in 2008. First the modernization of infrastructure and lifestyles provide satisfactory improvement of life quality for the villagers. This modernization process also serves to minimize the difference between urban and rural areas. Though the focus of the villagers and the local government has always been the same access to same infrastructure of rural and urban areas, this focus has been achieved well in these new villages.

The government's investment in the infrastructure of new villages and the villagers' consumption of modern public facilities together increase the domestic demand, consume the surplus production capacity of the urban industries, and also enhance the total economy of this specific area.

With the land requisition by the government in the new villages, surplus workforces were moved to the cities and became the resource of cheap labors for the economic development of the cities and their industrialization. Although people still live in rural areas due to the limitation of census register or the high cost of living expense in cities, in fact these people have already become migratory birds that commute between urban and rural areas daily.

While concerning the three types of construction of new villages (Figure 5-4), Type 1 and 2 practice reforms on Linpans and maintain the original areas, hence better satisfaction of the villagers. First reason to higher satisfaction will be the convenience of agricultural production. Because in traditional era, the walking range of the villagers from households to their farmlands limits the distance between Linapn, the new villages reformed from the original Linpans did not change much in the distance between the villagers' homes to their farmlands.

Second, since these two types of Linpan have smaller areas, the population is smaller;

hence large arbors are kept and larger spaces under the trees can be used to keep livestock or to plant economic plants such as vegetables or herbs. In these two kinds of new villages, the villagers can enjoy the modern infrastructures and maintain more of the original production function of the original Linpan to relief the life cost burden.

While in Type 3, larger scales of compact houses are built in the farmlands between traditional Linpans and move the villagers from surrounding Linapns to this area. Also, the household foundations in original Linpans are count in as farmlands of the villagers after covering then with earth. However, it is found that villagers in this kind of new villages have more dissatisfaction in general. The reason is first because of the long distance to farmlands. After the villagers were concentrated to the new villages, the walking distance between the new villages to the farmland increases significantly; hence most villagers need to depend on scooters or other transportation methods to commute to farmlands and this phenomenon lead to the increase in cost of time and life expense.

Secondly, due to the new villages were established directly on the farmlands instead of traditional Linpans, large arbors, bamboo forests and bushes are not available for use. Also, the arrayed style houses are identical to the communities in the cities. The greenbelts between buildings are no allowed to plant vegetables according to the planning regulations; hence the production function of this kind of new village is basically diminished. Hence the life cost of this style of new village is relatively higher than that of those in Type 1 and 2.

From the analysis on the three types of new villages, it is found that compared to the shrinking of living spaces, villagers value more on the sufficient spaces in front of or behind the house to maintain traditional production style in the determination of the success of New Village Construction Movement.

It is inferred that Type 3 new villages that damage the original Linpans and move all villages to a compact new community did not only lead to the damage of structure in the rural landscape, but also the exact type that villagers dislike.

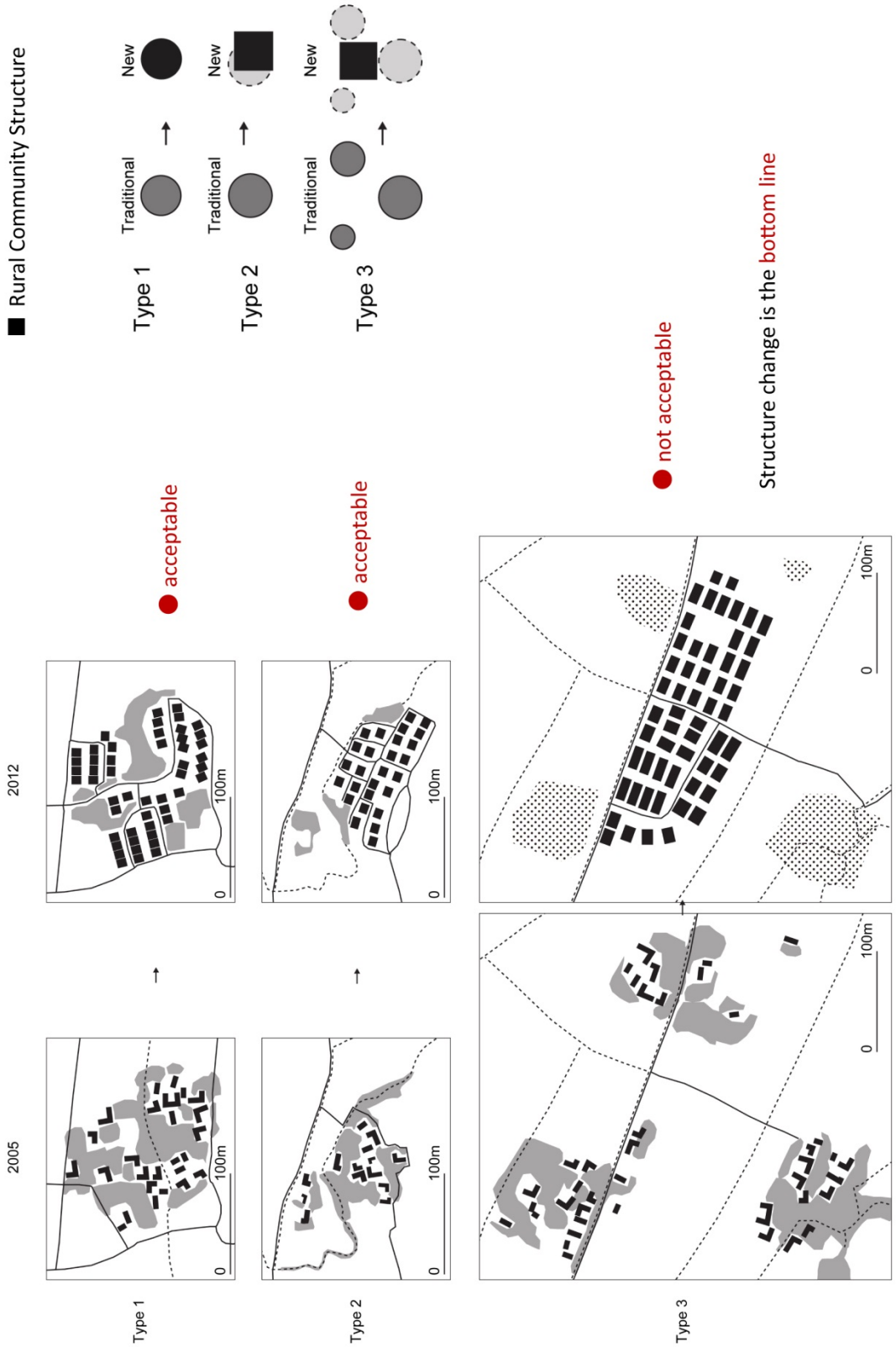


Figure 5-4 Peasants' Attitude towards Three Types of New Village

5.5 Rationale to these Transitions

To briefly summarize the aforesaid discussion, reasons that lead to the transition of landscapes including the self-initiated lifestyle change of the villagers and also the lifestyle change due to the external influences that forced the change. With both internal and external factors that work to change the landscape, the transition of rural landscape in Dujiangyan City has been in a continuous state since the start of modernization. There are four major reasons that lead to the transitions in lifestyles and landscapes of the villagers in these two eras.

5.5.1 The Rise of Commodity Economy

Since the reform in 1978, the commodity economy thrived with other development. From the transition of external environment point of view, the thriving of commodity economy changed the relation between rural villages and cities in a macro aspect.

In agrarian era, limited agricultural products are exchanged between cities and rural villages; hence the economic difference between the two is not distinctive. However, since the Early Modernization Era, when the commodity economy thrived, the unilateral development of the economy in urban area impoverished the economy of rural areas. Also, with the limitation of census register, the development of urban and rural areas were separated; hence no constant communication of life between the two areas and bigger difference of the life quality between the two. As a result, rural areas in these two periods of time had impoverished state of economy that was unable to respond to the modernization need of reforming buildings, roads and other landscape elements. It was also agreed that no great influences should be cast upon traditional rural landscapes due to those constant modernization works.

While since Mid-Modernization Era, with the improvement of commodity economy, the well-developed rural and urban market systems, and each industry in urban areas, the service industry expanded to rural areas. Under this kind of social context, the rural areas had not only become the supporter of agricultural products, industrial materials and cheap labors, but also became the giant consuming market of the surplus industrial productions of the cities and thus the new engine of the economic growth.

As a result, the development of modern commodity economy is the key force that helps to combine the urban and rural areas and it also makes each other the consuming market of their economy. As the interaction of rural and urban areas was encouraging the economic development of rural areas, the financial capability of villagers was increased to change their life quality, infrastructure, construction style and further to make influence on the rural landscape.

From a micro scale point of view, for better benefits, the villagers jumped out of the traditional self-sufficient production method and started new production according to the demand of the market. As in farmlands, the kiwi gardens and the ornamental plants seedling nurseries that respond directly to the market are the classic product of commodity economy.

5.5.2 The Rise of Urbanization

Since 1990, as the modernization accelerates, the expansion of the city nibbles up the rural areas and making the villagers on those lands become urban citizens. After 2000, as the urbanization works were in fast development state, the demand of ornamental trees and floral plants increased in urban residential areas, street blocks and also green spaces in parks.

Also, with the economic development of the cities, there are more chances to work and thus the surplus workforce will leave Linpans for job offers in the cities and lead to the hollowing trend of rural areas, which reached the peak in year 2000. As the urban economy kept improving, the outflow of population increased as well and lead to the sudden decrease in the agricultural workforce. Hence the impoverishment of rural areas was inevitable.

Since the income was limited with only agricultural business, people started to abandon the traditional agriculture and to work in towns. The idling of farmlands arose. But there were also villagers focused on the massive demands of greening trees of urbanization and changed the idled farmlands into loose-managed nurseries to achieve better income than planting crops.

Since 2008 after the Earthquake, for maintaining the ratio of farmlands, the government subsidizes villagers who maintain their farmlands that serve for farming purposes only (not for construction of houses, etc.). This subsidization made more

villagers to build nurseries on their idled farmlands to plant arbors and bushes that require more time to grow. In this way, farmland function was maintained to apply for subsidies from the government and also to increase income from the market. Most importantly, the villagers were able to leave their farmlands to work as industrial labors in the cities.

As a result, the tree landscape of nurseries in Linpan areas of Dujiangyan City has formed new agricultural landscape and new agroforestry system on the farmlands.

5.5.3 Government's Pursuit of Economic Growth

From a macro point of view, the agricultural population in China still takes up big percentage. Hence development focusing only on the urban areas without rural areas will suffer difficulties. Also, with the rural and urban economy gradually distinguished since 1978, great differences are found in the access to education, medical care, sanitation and also infrastructures and others. Therefore, the temporarily laggard economy of the rural areas serves as the key to increase domestic demand and provides great potential for the new economy growth.

The rural communities are not only the production base of agricultural products but also the consumer market of each commodity. From an industrial point of view, the New Village Construction Movement will demand heavily on concrete and steel, which are industries with surplus production in China. Hence the development of new villages can serve to relief the capital circulation of these industries.

In new rural communities, the integrated plans of designs for the buildings and the constructions conducted by the professional architecture firms together serve to increase the economic growth of the architectural industry and relative fields.

In the meantime, as the developers are involved in the construction of new rural communities, the newly built rural communities are with high building density. The government is thus able to put villagers in concentrated areas and change the spare lands that used to be Linpans to developable land measurement for commodity houses in the cities that allows benefit for the developers.

Via the concentration of the villagers in living spaces and also the concentration of land use, the government and developers can maintain farmland ratio and obtain great

economic benefit simultaneously. But the reform and damage done to Linpans lead to major changes in the structure of rural cultural landscape. The inappropriate development focusing only on the GDP growth has now been the primary problem needed to be tacked in the maintaining of landscape characteristics of rural areas in Dujiangyan City.

5.6 Summary

Different cultures in different eras will lead to transitions of landscapes. In Early Modernization Era, in terms of production, with the change of construction materials for buildings, the villagers' dependency on the forest in Linpan is decreased. However, though the landscape of these forests did not change, the function did, since the arbors and bushes of various species in the Linpan forests are used as raw materials for selling to papermaking and furniture companies. In addition to the traditional production of crops, vegetables and fruits, the nursery of seedling becomes new options for the diverse management of agriculture. Also, though the materials paved on the walls of the irrigation system are changed, the banding forest landscape starts to disappear as well.

In Mid-Modernization Era, In housing classification, the plans for the new rural communities are no longer decided by the villagers but by the government. The house layout in the new rural communities is no longer related to the traditional patriarchal clan conventions and with the shrinking of house size, the habit of living with the big family is no longer in practice. From the production classification, the trees in new rural communities are shared properties; hence no private trading of these trees is allowed. The nurseries of ornamental seedlings and the production of kiwifruits together form the scaled industrialization of the local production. With the lands are contracted out to private agricultural corporations, the farmers are hired again as industry workers. Also, as the reinforcement of the irrigation canals is accomplished, the banding tree landscapes along these canals are basically gone. While from the aspect of resource exchange, the agricultural production is highly related to the market demands, rural supplies and the urban requirements. As for roads in rural areas are in hierarchic system that has almost no banding tree landscapes left.

Every daily activity of the villagers will lead to corresponding cultural landscape spaces that are created based on the lifestyles and culture needs of the villagers; but

these landscapes also decay with the downfall of rural lifestyles. The rise of commodity economy and urbanization and the government's pursuit of economic growth together serve to be the underlying reasons to the changes of the lifestyles and landscapes of the rural villagers.

Chapter 6

Methodology of Sustainable Development Planning for Rural Cultural Landscape on Alluvial Plain in Dujiangyan City

Chapter 6. Methodology of Sustainable Development Planning for Rural Cultural Landscape on Alluvial Plain in Dujiangyan City

6.1 Introduction

Since the alluvial plain of Dujiangyan City is now during the Mid-Modernization Era, with the New Village Construction Movement after the earthquake as the start, the construction affairs for the new rural communities will proceed. It is therefore very important to conserve the traditional cultural landscapes during the development of rural communities. Based on the aforesaid discussion on the rationale to the changes of lifestyles and rural landscapes during early and mod-modernization eras, this chapter will proceed to the discussion on the conservation methods of the rural cultural landscapes both in regional and community scale.

6.2 Conservation Methodology in Regional Scale

The limited time had the scale of this study focused on the fan-shape area. Hence with the aforesaid analysis, this study will provide conservation methods at a regional scale.

6.2.1 Regulations in Regeneration Master Plan of Government

In the 2008 Dujiangyan Reconstruction Planning, the principles for preserving rural sceneries were confirmed for the first time. Concerning the fan-shape area land use planning, 4 kilometers wide greenbelt area was kept surrounding the main urban area to control the expansion of urbanized areas (Figure 6-1).

While in the vast rural area, principles for preserving rural sceneries in the Planning are as following [89][90].

▪ Via wedge-shaped green, the scenic forests spaces transit to traditional small-scaled green spaces and incorporate the rural scenery with urban greening landscapes as much as possible.

▪ The transition space of artificial to natural environment at the edge of urban construction lands should control the building floors in a descend way to bring the

construction style from urban to rural style.

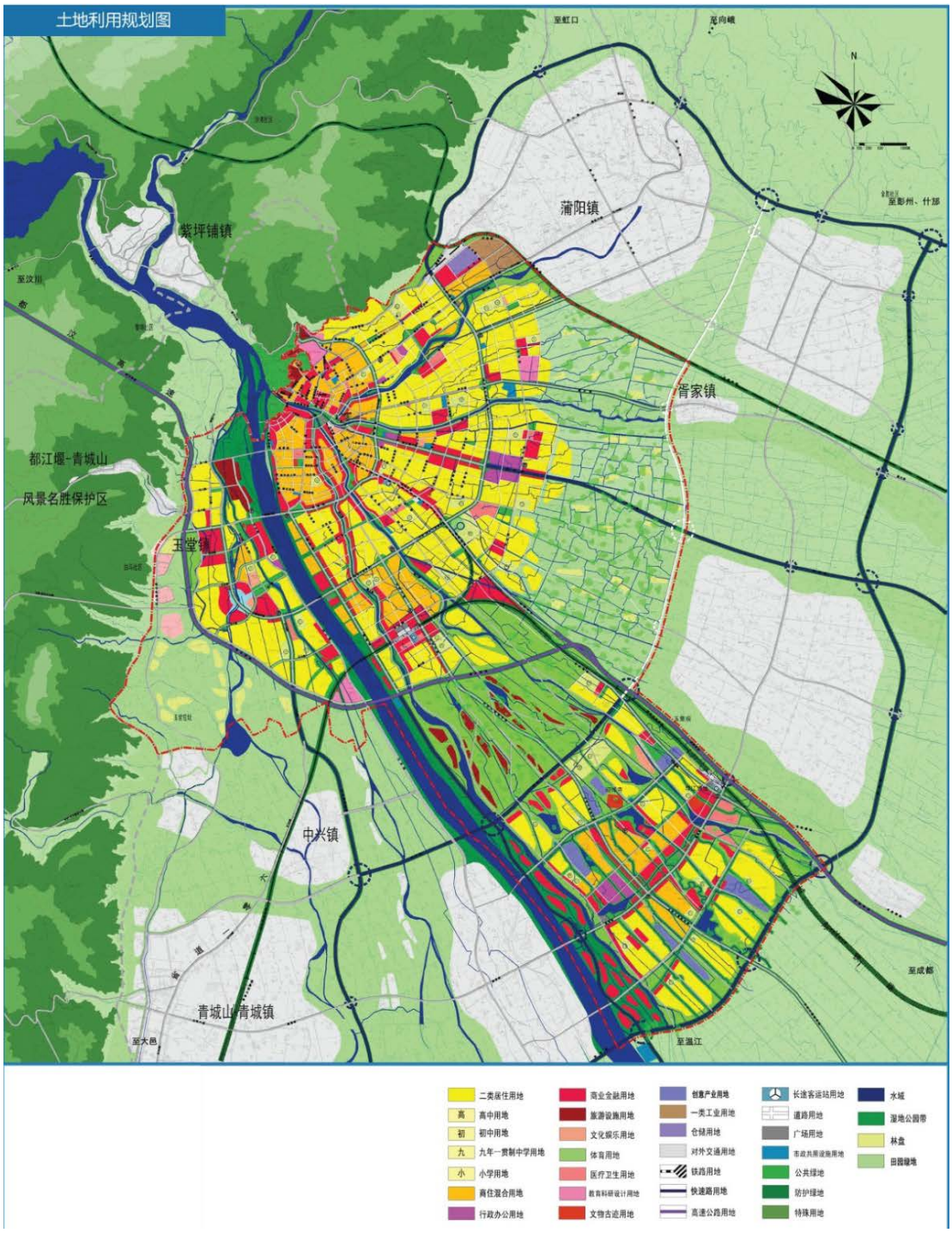


Figure 6-1 Master Plan of Fan-Shape Area[1]

▪ Small-scaled, less intensified and adequate construction should be practiced on the Linpans scattering among suburban areas to establish suburban recreational spaces that combines rural tourism and other recreation together.

[1] Data source: Chengdu Planning and Management Bureau (2008)

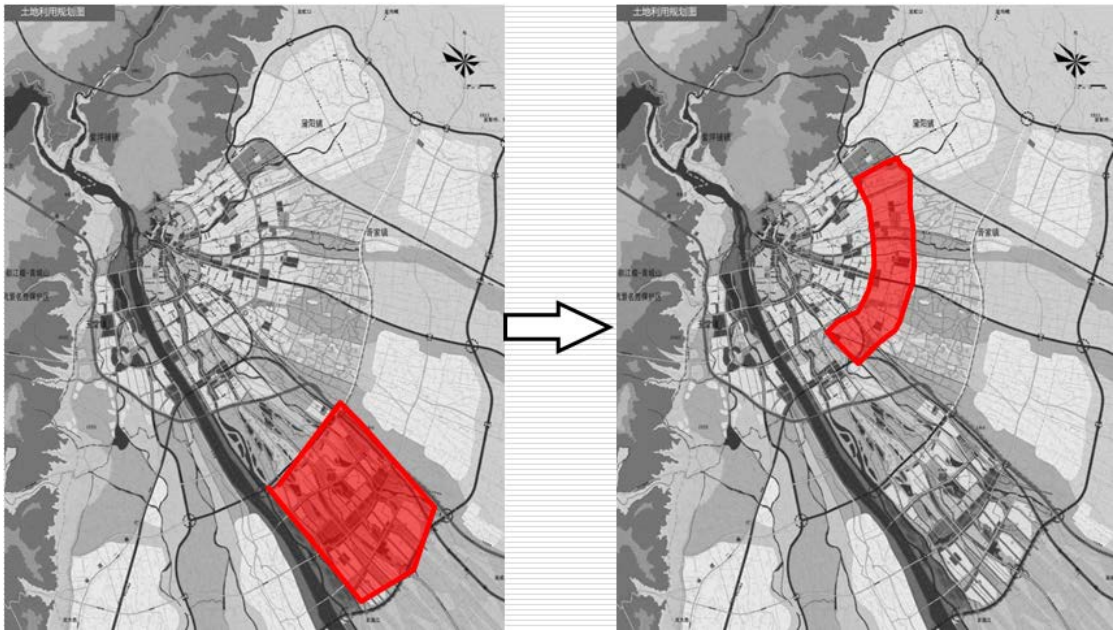


Figure 6-2 Change of New Town Development Method[1]

▪ All industrial development should be prohibited in greenbelt zone and the construction of new city blocks should not be on water nourishment areas. The total area of farmlands should not decrease and the residential land in rural areas should not expand.

▪ The irrigation system in rural areas is strictly protected and will not accept any alteration of the direction of the primary canals.

Another point worthy of notice in this Planning is the new town development areas reserved to deal with the increase of the population in urban areas and also for the prevention of unordinary expansion of urban areas. The main concept in the Planning is to concentrate the living of residents in new town to preserve more of the rural scenery in the surrounding areas.

Although the development of the New Town area has been assigned for the holding of the rapidly increasing population from the cities in the future, with the New Town being more distant from the traditional downtown area, and with the lack of well-established infrastructure, people who are willing to move there are currently limited. Hence the revival affairs after the Earthquake deal more with the development surrounding the traditional urban areas (Chen 2012) [91] (Figure 6-2).

[1] Data source: 陳捷 (2012)

6.2.2 Current Situation and Potential in Fan-Shape Area

Although there is a 4-kilometer wide rural area that is designated in the Planning to improve the ecological environment of the cities that also serves as greenbelt to prevent the unordinary expansion of urban areas, the Linpan cultural landscape in this greenbelt has no significant difference to those in other rural areas. From the irrigation system, the whole fan-shape area is covered by the Dujiangyan Irrigation System and from the crop production of these farmlands; in addition to the traditional crops, the nursery industry is flourishing as well.

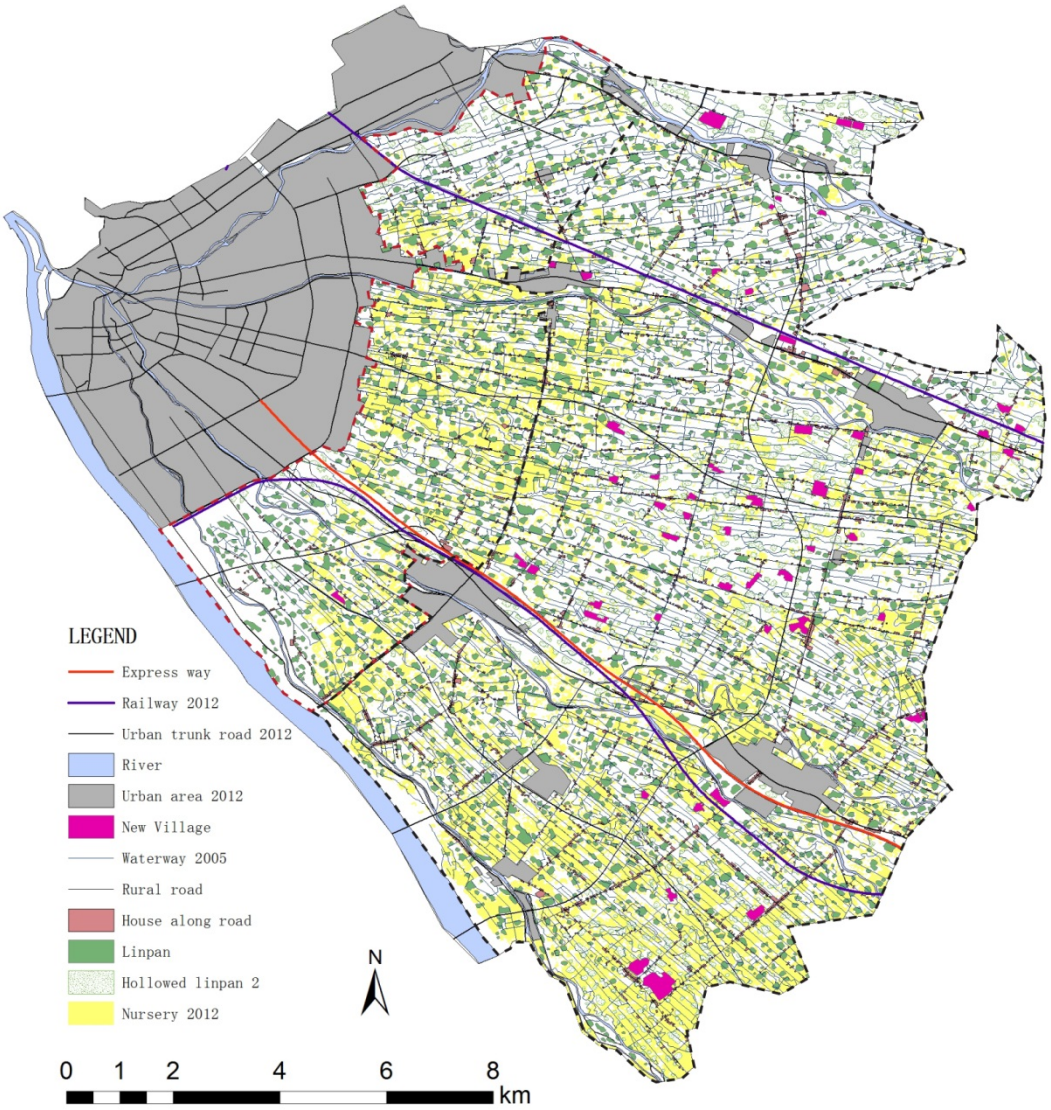


Figure 6-3 Current Land Use of Fan-Shape Area

The only difference is that with the restriction of residential area development in the

greenbelt area to preserve the original traditional Linpan landscape, most of the new villages were built in the rural areas that locate outside of the greenbelt. Around these large-scaled new villages, the original Linpans were forced idled hence caused significant changes to the holistic landscape structure.

Nevertheless, this study considers it important to preserve the Linpan areas that are not included in the current greenbelts as well. With the large amount of historic messages passed down by these rural cultural landscape in these areas, 2000 years of precious heritance of the Dujiangyan Irrigation System can be well understand. The rural cultural landscape of this fan-shape area as a whole has great potential to serve as the buffer zone for the World Heritage Dujiangyan and thus be protected.

6.2.3 Methodology of Rural Cultural Landscape Conservation Planning in Regional Scale

As a result, this study proposes that 2 greenbelts should be established in the fan-shape area. The Greenbelt 1 will be the “rural scenery zone” that is planned in the Dujiangyan Reconstruction Planning. The Greenbelt 2 will cover other rural areas in the fan-shape area. Nevertheless, based on the status quo, what is different from the Master Plan is that in Greenbelt 2, there are no developments of New Town assigned.

In Greenbelt 1, the current rural cultural landscape will receive strict preservation continuously. Also the nursery industry that serves to increase the income of villagers should be encouraged as well. In addition, since Greenbelt 1 is near the primary urban area, its recreational function can be further developed besides its ecological function and become the destination of rural tourism for the urban citizens.

In Greenbelt 2, also, the ecological and production function of the rural areas should be maintained with proper development of recreational function according to market demands. However, as the result of New Village Construction affairs after big earthquake in 2008, a part of the original Linpan farmers have been centralized into the new villages and they were required by government to return their homestead back to agricultural land. So it resulted in the appearance of lots of hollowed Linpan that surrounds new village and with no people living in. These hollowed Linpan have tremendous value in ecology, and they are also showing the evidence of traditional

rural lifestyle. The modernization of rural lifestyle of farmers is considered to be irrevocable, and the land arrangement is also necessary for the government to increase the production efficiency. So the development activities should be allowed in Greenbelt 2. And the regeneration and conservation policy in this region could be more flexible compared to Greenbelt 1 (Figure 6-4).

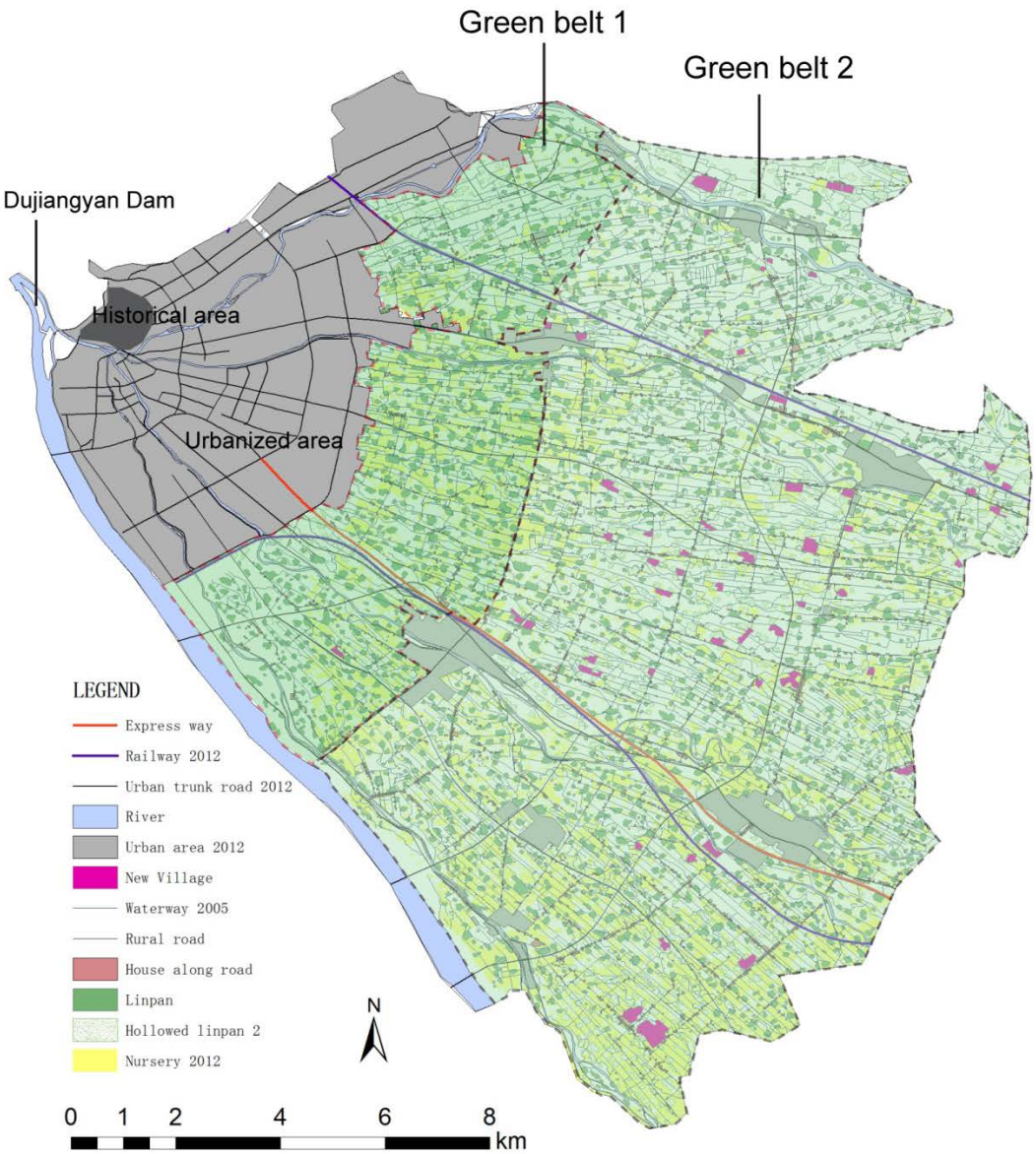


Figure 6-4 Proposal of Two Greenbelts for Cultural Landscape Conservation

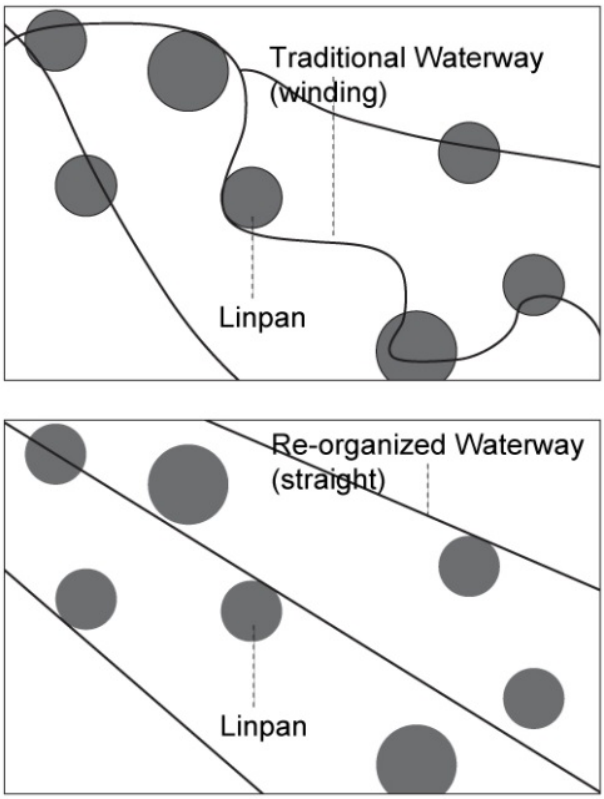


Figure 6-5 Linpan Cluster Classified by Traditional & Re-organized Waterway

With the analysis in Chapter 4, it is found that in the existing waterway system, two categories of waterway exist. One of which belongs to the traditional waterway, which is more curvy and wiggly. The vegetation along this kind of waterway is lush and exuberant and contains more historic messages that serve as good materials for the analysis of waterway distribution in the plain areas of Dujiangyan in ancient times. The other kind of waterway is much straighter. They are basically the reorganized waterway after 1978 and the vegetation along this kind of waterway is more scattered and thinner (Figure 6-5).

From the perspective of regional scale, if mark all these traditional waterways an re-organized waterway, the result would be shown as in Figure 6-6, and it could be seen that basically the two kinds of waterways distribute in groups, so it could be considered as the base of classification of rural community clusters.

As a result, according to the historic time difference of the formation of waterways and the distribution of the existing traditional Linpans and the new villages, this study intends to find out the cluster of these settlements combination as the basic unit for the rural cultural landscape conservation and sustainable development strategy.

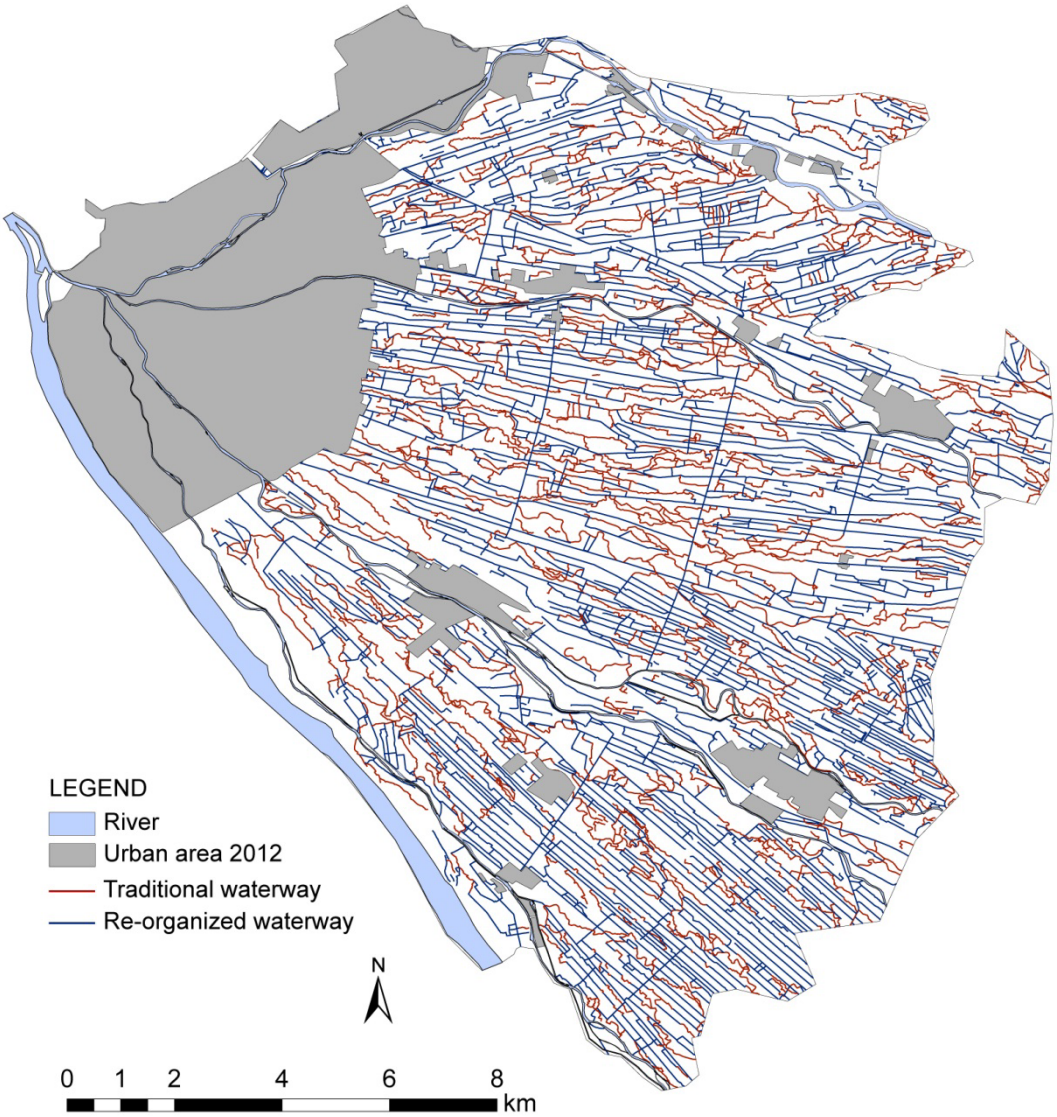


Figure 6-6 Traditional & Re-organized Waterway Network

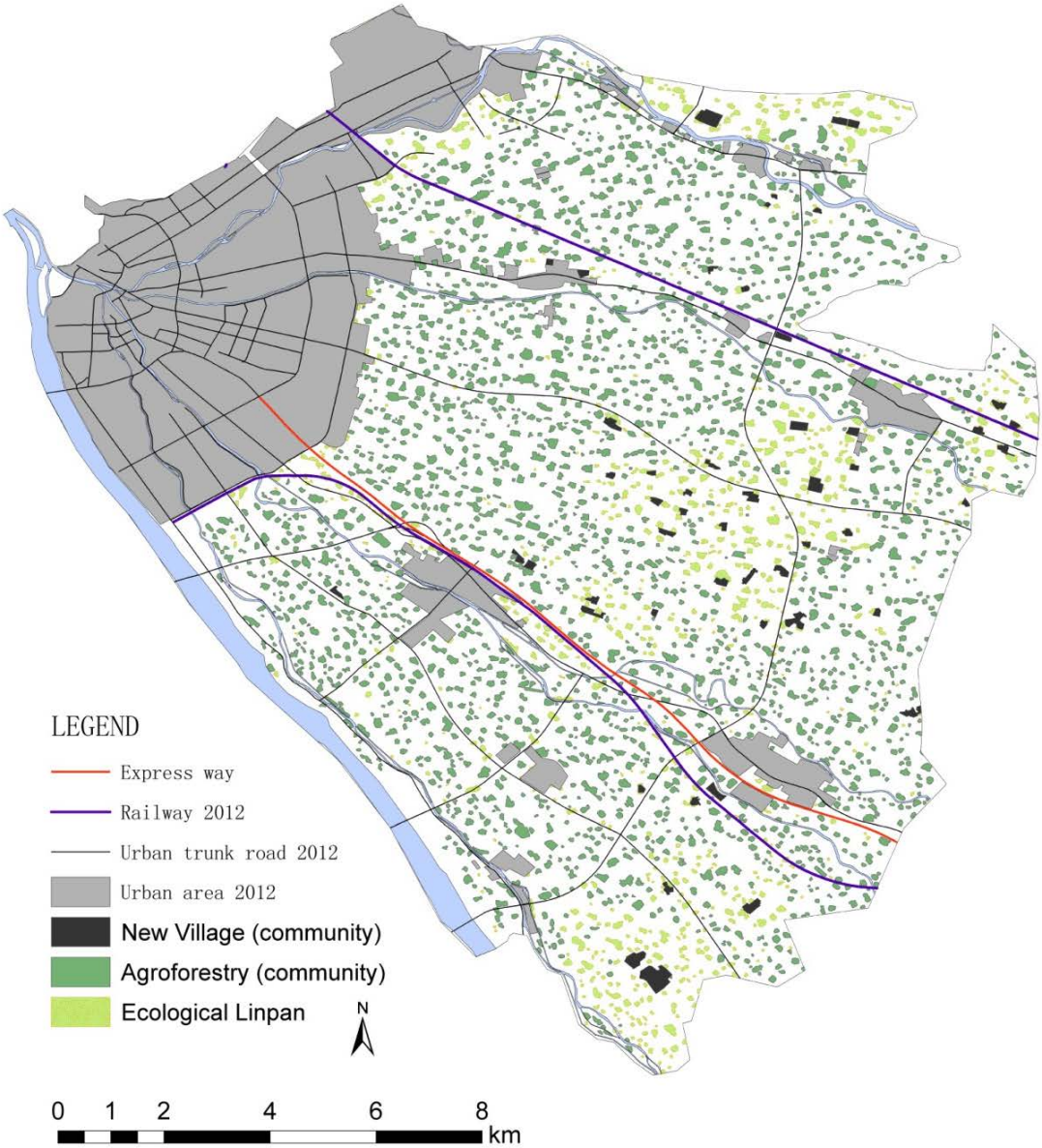


Figure 6-7 Agroforestry Community & Ecological Linpan

According to the Linpan Conservation Planning [92] [93], the conservation constructions for Linpans can be divided into four folds according to the characteristics of each Linpan, including the Agrarian, the Rural Tourism, the Special Industry and the Ecology types. It is recommended that reasonable development and utilization of Linpans based on the principle of conservation can be accepted to increase the income of the villagers and to develop the economy of Linpans.

① Agrarian Linpan. This type of Linpan depends mainly on the agricultural production; hence the vegetation in this kind of Linpan should be as traditional as

possible and the traditional style should also extend to the maintenance of buildings within Linpans to preserve the characteristics of residences. The historic and cultural messages and the ecologic environment that Agrarian Linpans inherits should also be protected.

② Rural Tourism Linpans. Linpans with better condition, convenient transportation and locates near towns or tourist attractions are known as Rural Tourism Linpans. This kind of Linpan should put their geographic advantages to the best use by the organized management on the environment, sanitation and building styles. Also, infrastructures, restaurants, hotels and recreational facilities should be completed to develop the rural tourism to provide activity spaces for the cities during weekends and also to increase the income of the villages.

③ Special Industry Linpans. This kind of Linpans should depend on the existed special traditional industries and to put focus on the development of planting greenhouse vegetables, fruits, herbs, flowers and trees and also the livestock industry. Economy with characteristics should be developed to increase the income of the villagers.

④ Ecology Linpans. Linpans with high importance on the conservation of water, soil and ecology, with great vegetation condition, and with small population or with population planned to be moved out hence about to become hollowed Linpans are known as Ecology Linpans. The fundamental function of this kind of Linpans is to maintain good ecologic environment and not focusing on any purposes related to living.

At the same time, in regional scale, the Zoning (Greenbelt) could be considered as the matrix, waterway network as corridor, and the rural community cluster as the core. So the methods of Landscape Ecology could also be applied in this fan-shape area.

First of all, the matrix could be seen as Greenbelt 1 and Greenbelt 2. And the traditional and re-organized waterway (corridor) networks contribute to the base of cluster classification.

Then, the regeneration planning methods of combination of rural community with different function could be applied and totally 12 types of Cluster Type (core) has been provided.

For example, in Greenbelt 1, the Agrarian Linpan together with Tourism-oriented Linpan and the traditional winding waterway consist of Cluster Type A1, which is recreational cluster, and the preservation policy and rural tourism development regulations should be applied together. While, the Agrarian Linpan together with Special Industry Linpan and traditional waterway consist of Cluster Type A2, which could be seen as the new rural industry cluster. Besides, the New Village together with hollowed (ecological) Linpan in surrounding, and the traditional waterway consist of Cluster Type A3, and this could been considered as the new development idea in this region.

Basically, the combination of “Agrarian + Tourism-oriented Linpan”, “Agrarian + Special Industry Linpan” and the “New Village + Ecological Linpan” would be the three major types of cluster designation. And the total 12 types of Cluster should be applied into the whole fan-shape area to identify and carry out the different conservation and management regulations in order to achieve the sustainable development.

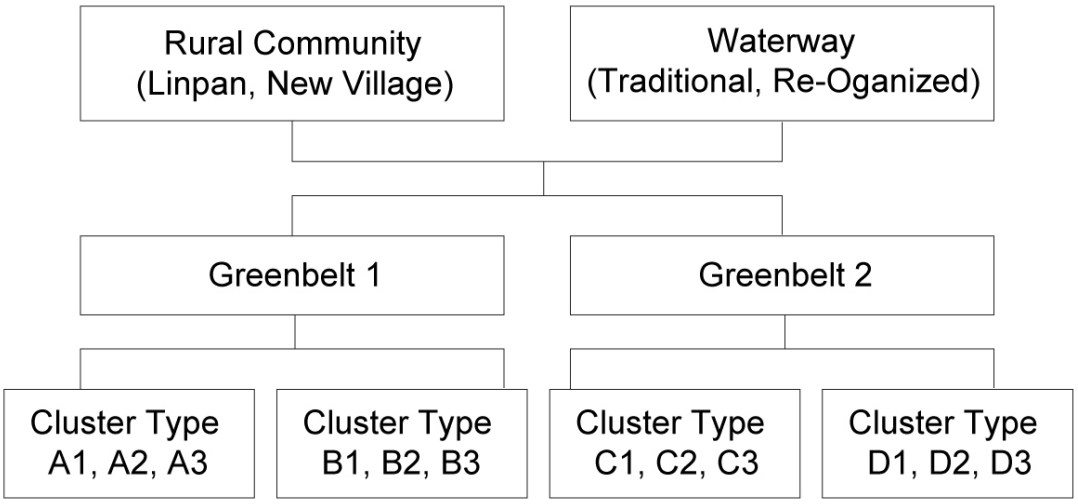


Figure 6-8 Sustainable Development Planning Methodology of Rural Cultural Landscape in Greenbelt 1 and 2

Table 6-1 Proposed Types of Community Cluster in Greenbelt 1 and 2

	Linpan & New Village (Core)					Waterway Network (Corridor)		Zoning(Matrix)	
Cluster Type	Agrarian Linpan	Tourism-oriented linpan	Special Industry Linpan	Ecological Linpan	New Village	Traditional (winding)	Re-organized (straight)	Greenbelt 1	Greenbelt 2
A1	●	●				●		●	
A2	●		●						
A3				●	●				
B1	●	●					●		
B2	●		●						
B3				●	●				
C1	●	●				●			●
C2	●		●						
C3				●	●				
D1	●	●					●		
D2	●		●						
D3				●	●				

Table 6-2 Linpan Cluster Type A1

Linpan Cluster Type A1 (Combination of Agrarian Linpan & Tourism-oriented Linpan in G.B.1)			
Cultural Landscape		Conservation	Activation
Waterway	Water Gate	●	could be transformed to be tourism spot
	Hierarchy System	●	
	Traditional Waterway Network (winding)	●	
	Metasequoia Trees	●	
Agroforestry (Linpan)	Bamboo Grove	●	
	Camphor Trees	●	
	Cattle Keeping Yard	●	
	Vegetable Garden	●	
	Traditional Architecture	◐	farmhouse restaurant, teahouse
Farmland	Rice Paddy	◐	could be transformed to be tourism spot
	Wheat Field	◐	
	Canola Flower Field	◐	
	Tree Nursery	○	
● Level 1 : should be strictly preserved			
◐ Level 2 : should tried to be conserved			
○ Level 3 : could be changed according to farmer's needs			

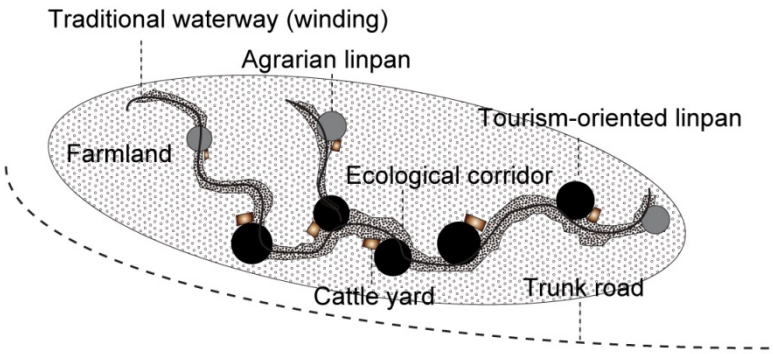


Table 6-3 Linpan Cluster Type A2

Linpan Cluster Type A2 (Combination of Agrarian Linpan & Special Industry Linpan in G.B.1)			
Cultural Landscape		Conservation	Activation
Waterway	Water Gate	●	
	Hierarchy System	●	
	Traditional Waterway Network (winding)	●	
	Metasequoia Trees	●	
Agroforestry (Linpan)	Bamboo Grove	◐	vegetables, fruits, herbs, flowers, trees,livestock industry (under woods)
	Camphor Trees	◐	
	Cattle Keeping Yard	◐	
	Vegetable Garden	◐	
	Traditional Architecture	◐	
Farmland	Rice Paddy	○	greenhouse vegetables, fruits, herbs, flowers and trees and also the livestock industry.
	Wheat Field	○	
	Canola Flower Field	○	
	Tree Nursery	○	
● Level 1 : should be strictly preserved			
◐ Level 2 : should tried to be conserved			
○ Level 3 : could be changed according to farmer's needs			

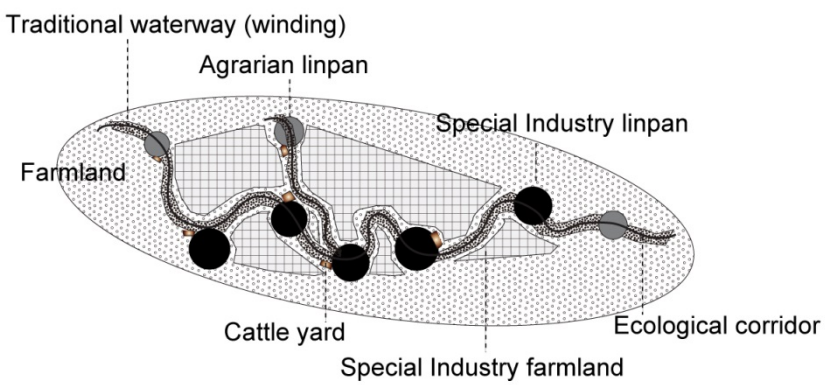


Table 6-4 Linpan Cluster Type A3

Linpan Cluster Type A3 (Combination of Ecological Linpan & New Village in G.B.1)			
Cultural Landscape		Conservation	Activation
Waterway	Water Gate	●	
	Hierarchy System	●	
	Traditional Waterway Network (winding)	●	
	Metasequoia Trees	●	
Agroforestry (Linpan)	bamboo Grove	◐	homestead could be return to farmland
	Camphor Trees	◐	
	Cattle Keeping Yard	○	
	Vegetable Garden	○	
	Traditional Architecture	○	
New Village	Woods	○	could be modernized
	Architecture	○	
Farmland	Rice Paddy	◐	traditional farming industry could be inherited
	Wheat Field	◐	
	Canola Flower Field	◐	
	Tree Nursery	○	
● Level 1 : should be strictly preserved			
◐ Level 2 : should tried to be conserved			
○ Level 3 : could be changed according to farmer's needs			

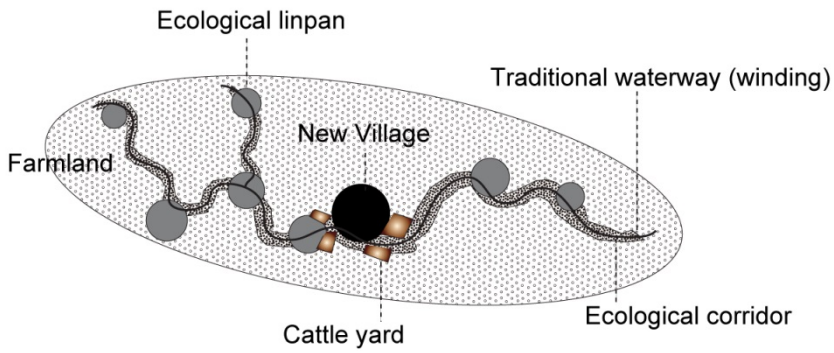


Table 6-5 Linpan Cluster Type B1

Linpan Cluster Type B1 (Combination of Agrarian Linpan & Tourism-oriented Linpan in G.B.1)			
Cultural Landscape		Conservation	Activation
Waterway	Water Gate	●	could be transformed to be tourism spot
	Hierarchy System	●	
	Re-organized Waterway Network (straight)	●	
	Metasequoia Trees	●	
Agroforestry (Linpan)	Bamboo Grove	●	
	Camphor Trees	●	
	Cattle Keeping Yard	◐	
	Vegetable Garden	◐	
	Traditional Architecture	◐	farmhouse restaurant, teahouse
Farmland	Rice Paddy	◐	could be transformed to be tourism spot
	Wheat Field	◐	
	Canola Flower Field	◐	
	Tree Nursery	○	
● Level 1 : should be strictly preserved			
◐ Level 2 : should tried to be conserved			
○ Level 3 : could be changed according to farmer's needs			

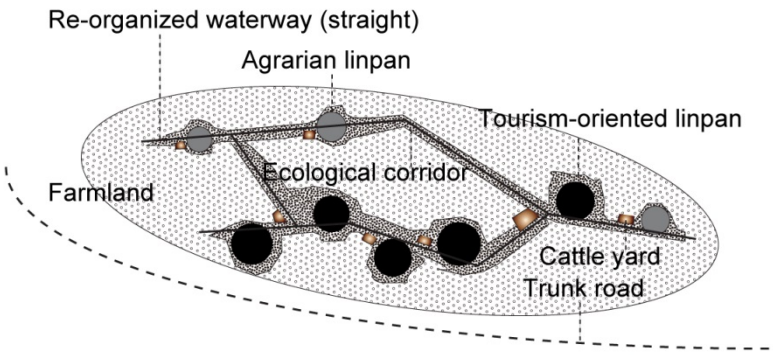


Table 6-6 Linpan Cluster Type B2

Linpan Cluster Type B2 (Combination of Agrarian Linpan & Special Industry Linpan in G.B.1)			
Cultural Landscape		Conservation	Activation
Waterway	Water Gate	●	
	Hierarchy System	●	
	Re-organized Waterway Network (straight)	●	
	Metasequoia Trees	●	
Agroforestry (Linpan)	Bamboo Grove	◐	vegetables, fruits, herbs, flowers, trees,livestock industry (under woods)
	Camphor Trees	◐	
	Vegetable Garden	◐	
	Cattle Keeping Yard	◐	
	Traditional Architecture	◐	
Farmland	Rice Paddy	○	greenhouse vegetables, fruits, herbs, flowers and trees and also the livestock industry.
	Wheat Field	○	
	Canola Flower Field	○	
	Tree Nursery	○	
● Level 1 : should be strictly preserved			
◐ Level 2 : should tried to be conserved			
○ Level 3 : could be changed according to farmer's needs			

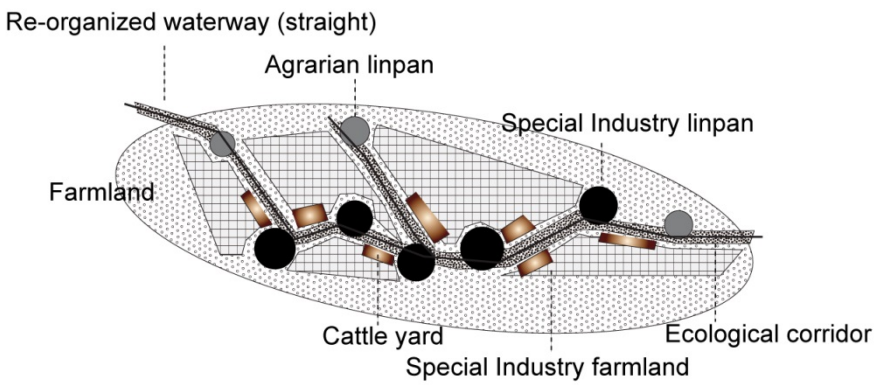


Table 6-7 Linpan Cluster Type B3

Linpan Cluster Type B3 (Combination of Ecological Linpan & New Village in G.B.1)			
Cultural Landscape		Conservation	Activation
Waterway	Water Gate	●	
	Hierarchy System	●	
	Re-organized Waterway Network (straight)	●	
	Metasequoia Trees	●	
Agroforestry (Linpan)	Bamboo Grove	◐	homestead could be return to farmland
	Camphor Trees	◐	
	Cattle Keeping Yard	○	
	Vegetable Garden	○	
	Traditional Architecture	○	
New Village	Woods	○	could be modernized
	Architecture	○	
Farmland	Rice Paddy	◐	traditional farming industry could be inherited
	Wheat Field	◐	
	Canola Flower Field	◐	
	Tree Nursery	○	
● Level 1 : should be strictly preserved			
◐ Level 2 : should tried to be conserved			
○ Level 3 : could be changed according to farmer's needs			

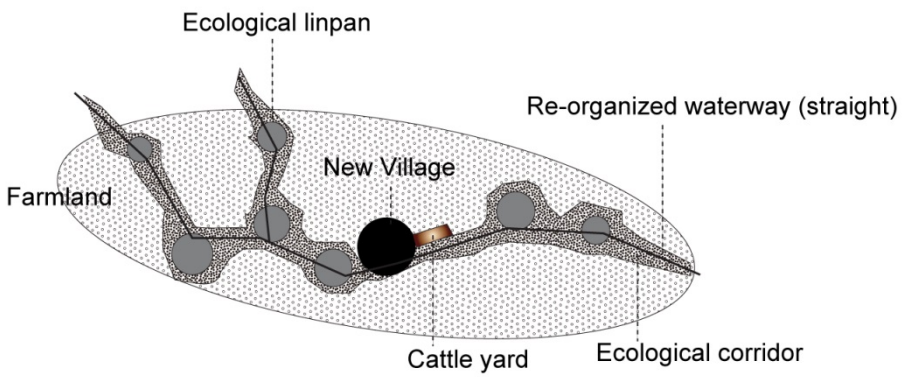


Table 6-8 Linpan Cluster Type C1

Linpan Cluster Type C1 (Combination of Agrarian Linpan & Tourism-oriented Linpan in G.B.2)			
Cultural Landscape		Conservation	Activation
Waterway	Water Gate	●	could be transformed to be tourism spot
	Hierarchy System	●	
	Traditional Waterway Network (winding)	●	
	Metasequoia Trees	◐	
Agroforestry (Linpan)	Bamboo Grove	◐	
	Camphor Trees	◐	
	Cattle Keeping Yard	◐	
	Vegetable Garden	◐	
	Traditional Architecture	○	farmhouse restaurant, teahouse
Farmland	Rice Paddy	○	could be transformed to be tourism spot
	Wheat Field	○	
	Canola Flower Field	○	
	Tree Nursery	○	
● Level 1 : should be strictly preserved			
◐ Level 2 : should tried to be conserved			
○ Level 3 : could be changed according to farmer's needs			

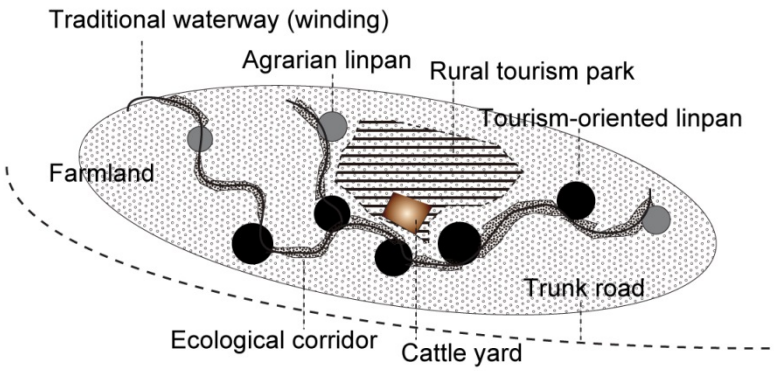


Table 6-9 Linpan Cluster Type C2

Linpan Cluster Type C2 (Combination of Agrarian Linpan & Special Industry Linpan in G.B.2)			
Cultural Landscape		Conservation	Activation
Waterway	Water Gate	●	
	Hierarchy System	●	
	Traditional Waterway Network (winding)	●	
	Metasequoia Trees	◐	
Agroforestry (Linpan)	Bamboo Grove	◐	vegetables, fruits, herbs, flowers, trees,livestock industry (under woods)
	Camphor Trees	◐	
	Cattle Keeping Yard	○	
	Vegetable Garden	○	
	Traditional Architecture	○	
Farmland	Rice Paddy	○	greenhouse vegetables, fruits, herbs, flowers and trees and also the livestock industry.
	Wheat Field	○	
	Canola Flower Field	○	
	Tree Nursery	○	
● Level 1 : should be strictly preserved			
◐ Level 2 : should tried to be conserved			
○ Level 3 : could be changed according to farmer's needs			

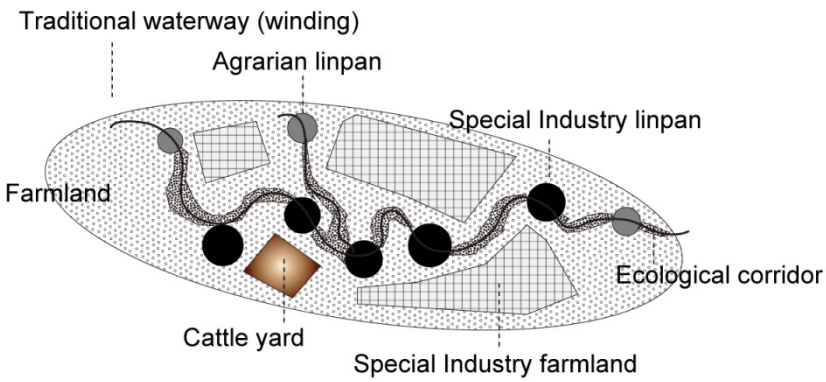


Table 6-10 Linpan Cluster Type C3

Linpan Cluster Type C3 (Combination of Ecological Linpan & New Village in G.B.2)			
Cultural Landscape		Conservation	Activation
Waterway	Water Gate	●	
	Hierarchy System	●	
	Traditional Waterway Network (winding)	●	
	Metasequoia Trees	◐	
Agroforestry (Linpan)	Bamboo Grove	◐	homestead could be return to farmland
	Camphor Trees	◐	
	Cattle Keeping Yard	○	
	Vegetable Garden	○	
	Traditional Architecture	○	
New Village	Woods	○	could be modernized
	Architecture	○	
Farmland	Rice Paddy	○	traditional farming industry could be inherited
	Wheat Field	○	
	Canola Flower Field	○	
	Tree Nursery	○	
● Level 1 : should be strictly preserved			
◐ Level 2 : should tried to be conserved			
○ Level 3 : could be changed according to farmer's needs			

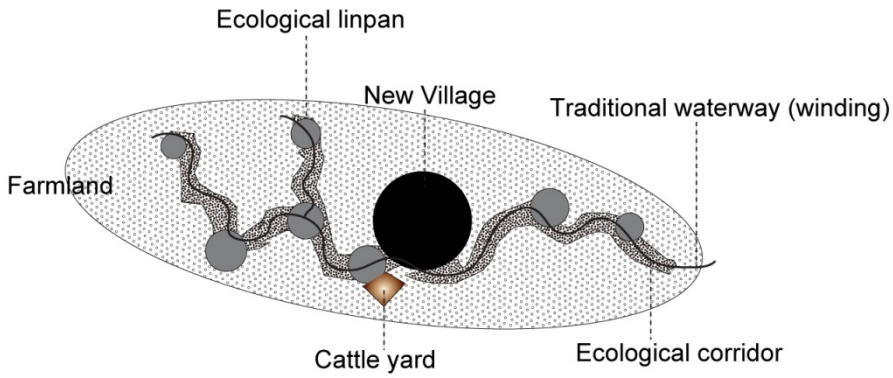


Table 6-11 Linpan Cluster Type D1

Linpan Cluster Type D1 (Combination of Agrarian Linpan & Tourism-oriented Linpan in G.B.2)			
Cultural Landscape		Conservation	Activation
Waterway	Water Gate	◐	could be transformed to be tourism spot
	Hierarchy System	◐	
	Re-organized Waterway Network (straight)	◐	
	Metasequoia Trees	◐	
Agroforestry (Linpan)	Bamboo Grove	◐	
	Camphor Trees	◐	
	Cattle Keeping Yard	○	
	Vegetable Garden	○	
	Traditional Architecture	○	farmhouse restaurant, teahouse
Farmland	Rice Paddy	○	could be transformed to be tourism spot
	Wheat Field	○	
	Canola Flower Field	○	
	Tree Nursery	○	
● Level 1 : should be strictly preserved			
◐ Level 2 : should tried to be conserved			
○ Level 3 : could be changed according to farmer's needs			

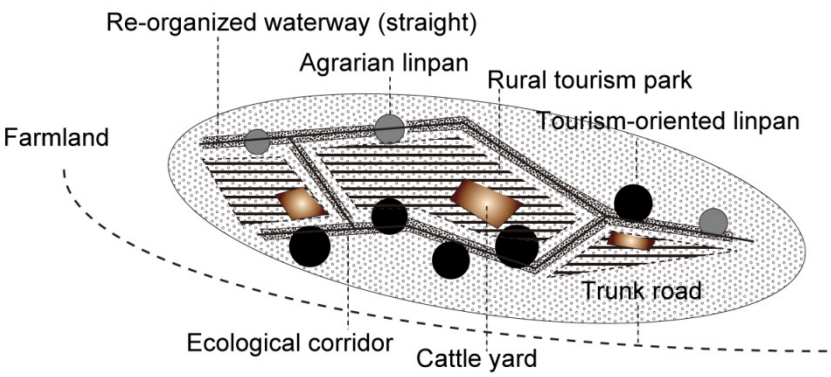


Table 6-12 Linpan Cluster Type D2

Linpan Cluster Type D2 (Combination of Agrarian Linpan & Special Industry Linpan in G.B.2)			
Cultural Landscape		Conservation	Activation
Waterway	Water Gate	◐	
	Hierarchy System	◐	
	Re-organized Waterway Network (straight)	◐	
	Metasequoia Trees	◐	
Agroforestry (Linpan)	Bamboo Grove	◐	vegetables, fruits, herbs, flowers, trees,livestock industry (under woods)
	Camphor Trees	◐	
	Cattle Keeping Yard	○	
	Vegetable Garden	○	
	Traditional Architecture	○	
Farmland	Rice Paddy	○	greenhouse vegetables, fruits, herbs, flowers and trees and also the livestock industry.
	Wheat Field	○	
	Canola Flower Field	○	
	Tree Nursery	○	
● Level 1 : should be strictly preserved			
◐ Level 2 : should tried to be conserved			
○ Level 3 : could be changed according to farmer's needs			

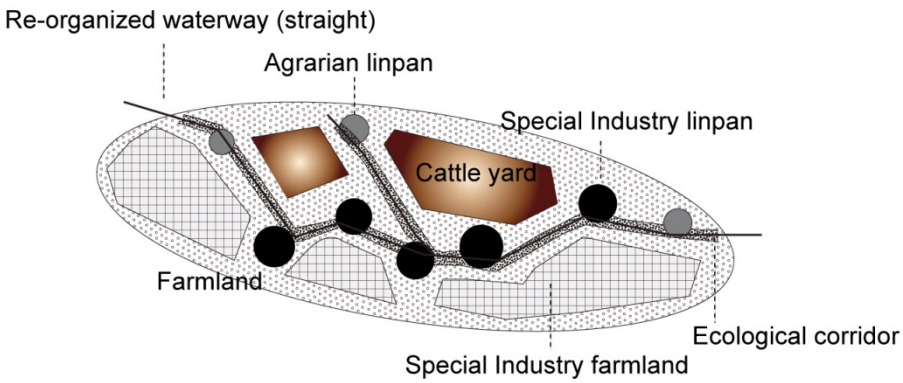
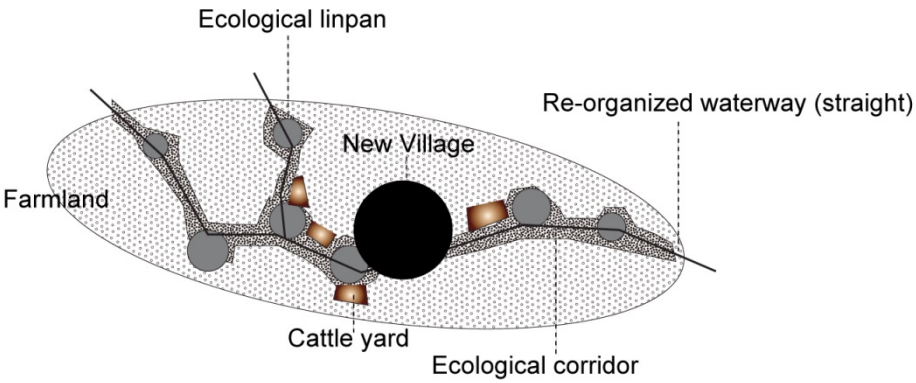


Table 6-13 Linpan Cluster Type D3

Linpan Cluster Type D3 (Combination of Ecological Linpan & New Village in G.B.2)			
Cultural Landscape		Conservation	Activation
Waterway	Water Gate	◐	
	Hierarchy System	◐	
	Re-organized Waterway Network (straight)	◐	
	Metasequoia Trees	◐	
Agroforestry (Linpan)	Bamboo Grove	◐	homestead could be return to farmland
	Camphor Trees	◐	
	Cattle Keeping Yard	○	
	Vegetable Garden	○	
	Traditional Architecture	○	
New Village	Woods	○	could be modernized
	Architecture	○	
Farmland	Rice Paddy	○	traditional farming industry could be inherited
	Wheat Field	○	
	Canola Flower Field	○	
	Tree Nursery	○	
● Level 1 : should be strictly preserved			
◐ Level 2 : should tried to be conserved			
○ Level 3 : could be changed according to farmer's needs			



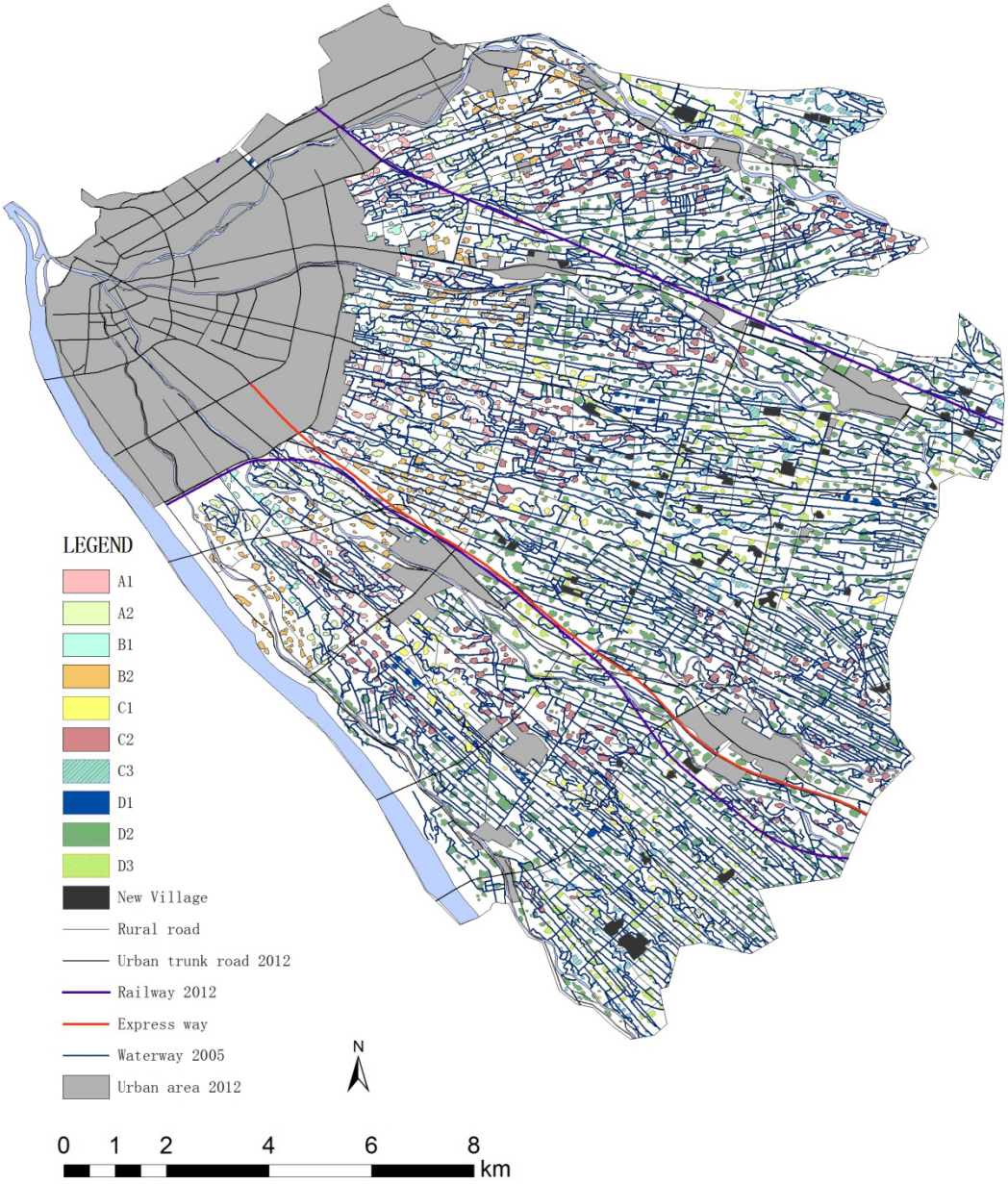


Figure 6-9 Sustainable Development Planning for Linpan

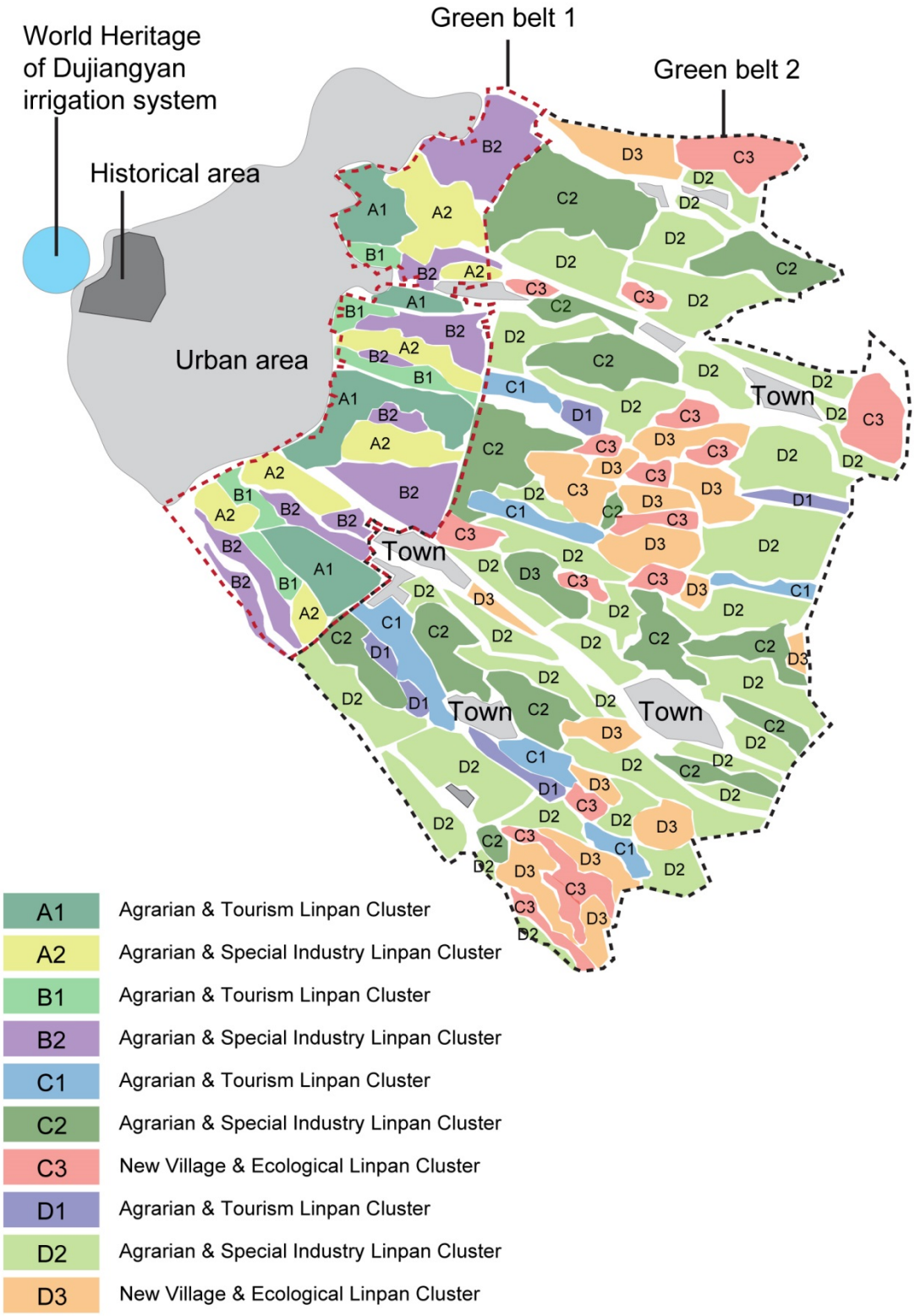
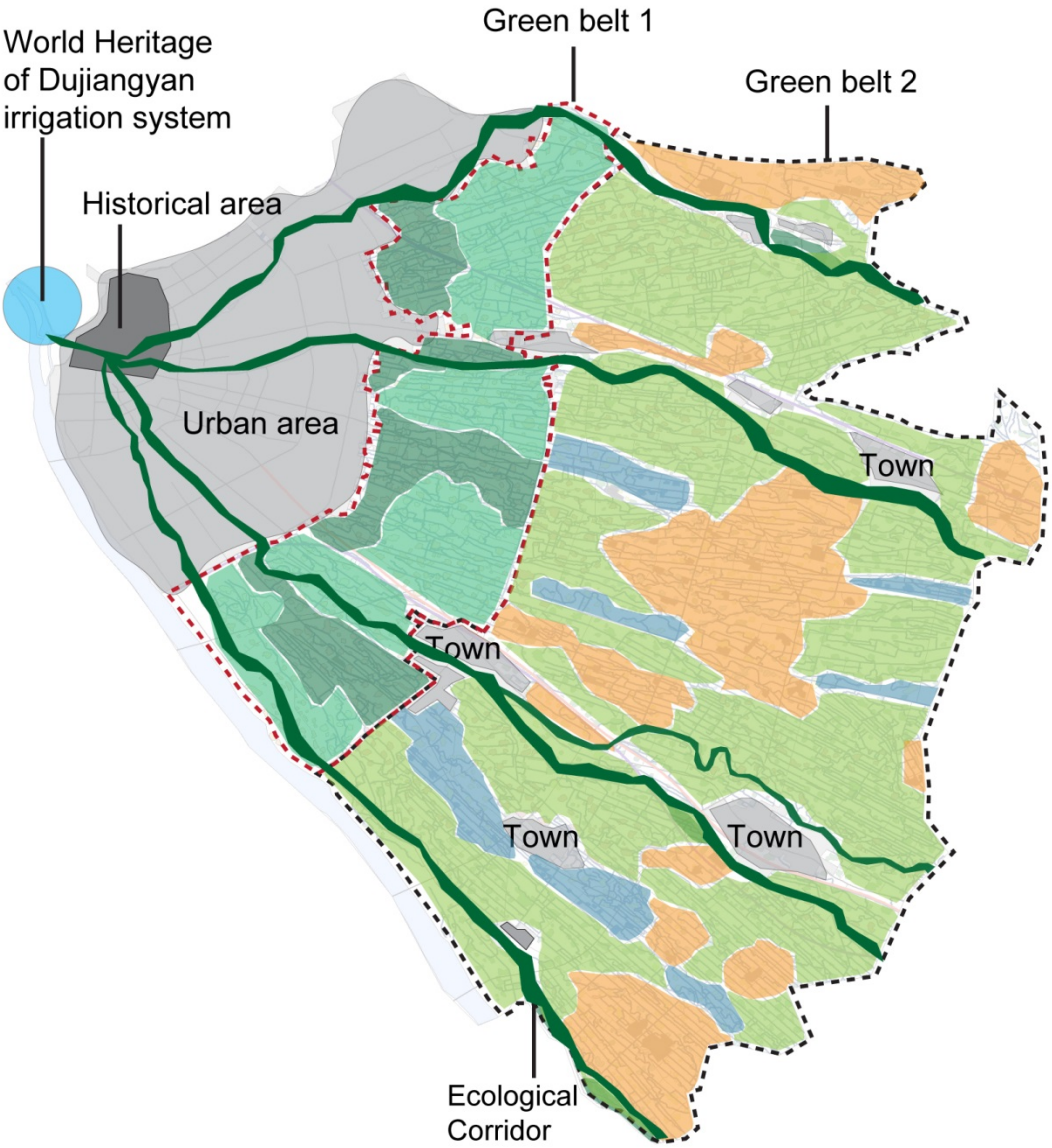


Figure 6-10 Rural Cultural Landscape Cluster Map



Greenbelt 1	Agrarian + tourism Linpan	①	
	Agrarian + special industry Linpan	②	
Greenbelt 2	Agrarian + tourism Linpan	③	
	Agrarian + special industry Linpan	④	
	New village + ecological Linpan	⑤	

Figure 6-11 Sustainable Development Planning of Rural Cultural Landscape in Dujiangyan City

In short, at the regional scale, two respective greenbelts were specified in the fan-shape area. Greenbelt 1 is designated as the preservation core zone of the Linpan cultural landscape. This study advises strongly against the development of new villages in this area for the better preservation of the traditional landscape structures and the essential landscape elements. Greenbelt 2 is designated as the buffer zone of Greenbelt 1, and the development of new villages with proper intensity would be acceptable. In addition to the zoning policy, based on the precise studies about traditional and re-organized waterway networks, 12 types of rural community clusters have been identified, and the rural cultural landscape cluster map has been made. Furthermore, the different regulations that should be applied to each cluster type in order to achieve the target of conservation and revitalization of rural cultural landscape in regional scale have been proposed. By combining the zoning policy and cluster management policy, the methodology of the sustainable development planning for rural cultural landscape has been proposed (Figure 6-9, Figure 6-10, Figure 6-11).

6.2.4 Proposed Regulations in Regional Scale

Based on the aforesaid analysis, this study will propose regional regulations in the fan-shape area as the following:

▪ The Linpan cultural landscape in fan-shape area refers to the paddy fields and dry lands developed and farmed by the local villagers. Relative irrigation system, Linpan settlements and other natural or human landscape are included in this cultural landscape.

▪ The preservation and management of the Linpans in fan-shape area should follow the principles of prioritizing the preservation, unified planning, scientific management, reasonable development and sustainability.

▪ The administrative planning at different scale in the fan-shape area should be based on rural villages and respect highly of the opinions of the villagers to demonstrate local and rural characteristics.

▪ According to the status quo of the fan-shape area, the Linpan area can be divided into preservation core zone and buffer zone. Since the Linpan resources in Greenbelt 1 are not damaged, it can serve as the core zone for preservation. While in the case of Greenbelt 2, it can serve as buffer zone to accommodate larger scale of New Village

Construction movement.

▪ The villagers in fan-shape area should have priority access to the business management right to use Linpan resources for tourism, restaurants, housing, and exhibitions.

▪ Establishing, reforming and expanding buildings, structural constructions in greenbelts should have coordinated layout, exterior design and colors with the surrounding landscape and environment. Traditional style of constructions and colors are encouraged as well as the traditional structural techniques.

▪ When doing urbanization works in new town, the original irrigation system should be preserved and considered to change the original Linpan to residential green spaces or for production, recreational and greening functions.

6.3 Methodology of Rural Cultural Landscape Planning in Community Scale

The rural communities that formed mostly from Linpans in the fan-shape area are the smallest units to construct the rural cultural landscape. Hence in addition to the guidelines to the regional planning, this study will also propose conservation strategies for the community (Linpan) units.

6.3.1 Current Situation and Potential

In Greenbelt 1, there are three kinds of Linpans. The first one will be the traditional Linapn that still remains traditional production and living function. The agroforestry system in this kind of Linpan is more complete. This kind of Linpan has the most quantity. Villagers living in this kind of Linpan should be encouraged to maintain traditional production lifestyle to preserve the traditional characteristics of Linpan area.

The second kind will be those hollowed Linpans with population outflow. This kind of Linpan is usually small in size and densely wooded due to idle and inhabitant condition. This kind of Linpan serve best for the ecological function and has great potential to be used as industrial Linpan for the production of woods.

The third kind of Linpan are those tourism-oriented Linpan established along the

primary roads of the rural areas thrived from the rural tourism recently. This kind of Linpan distributed along both sides of the roads ad offer food and recreational facilities for the urban citizens. As a typical case of modernization of Linpans, it also serves to increase the income of the villagers and helps the villagers to maintain the traditional characteristics to attract tourists. Hence this kind of Linpan has great potential to be promoted to the rural areas.

In Greenbelt 2, the aforesaid three types of Linpans also exist; hence similar development potential and strategies are suggested.

However, what is different in Greenbelt 2 is that the reconstruction works after the Earthquake established quite a few concentrated new villages and caused great changes to the landscape structure.

For New Village Type 1, cince this kind of new village was built based on the original spot of Linpan, hence it has better inheritance of the traditions. The villagers in the new village can maintain more of their original production and lifestyles. As a result, this method of New Village Construction is worthy of encouragement.

While in the case of New Village Type 2, since it is built on original Linpan and with expansion, hence the scale of expansion should be strictly controlled and to preserve forest spaces in the surrounding areas.

As for the case of New Village Type 3, with their larger size in area and construction site on the farmlands between Linpans without trees around, forest planting zones can be considered to be established surround the new village to let the villagers restore their traditional lifestyle. In the long run, Linpan landscape restoration can be considered among options to move villagers in the new village back to their original Linpans.

6.3.2 Proposal of Rural Community Pattern

For no matter the modernization of traditional Linapans or the New Village Construction Movement, the evolution line of traditional rural cultural landscape should be followed. Hence the New Village Type 3 in the aforesaid section is not recommended. For the following New Village Construction works, four aspects should be noticed as the following (Table 6-14).

First will be concerning the architecture style and plant species, the change of these landscape elements have decisive influence on the traditional landscape style, which belongs to the tangible section of the landscape, and is also the elements most easily changed according to the production and life needs of the villagers.

Second, members from the same family that lives near one another usually form the family unit in traditional Linpans. Hence the family units are the basic structure of land use in Linpans. Though intangible consanguinity decides this specific landscape structure, it is hard to observe by eyes.

Third, the traditional Linpan structure includes the layout of buildings, road system, irrigation system, forest in Linpan, vegetable gardens, livestock cottage and so forth. Traditionally family will be the unit of these distributions but in the current new villages, the traditional family unit is hard to exist.

Finally, concerning the traditional agroforestry system, usually in traditional agrarian era the self-sufficient energy circulation system is the important index to understand whether the community is maintaining good rural production lifestyle. Though the aforesaid three aspects are changeable, with maintaining basic agroforestry system, the most important concepts of the traditional Linpans can still be inherited.

Hence for the following reforms of Linpans or New Village Construction works, the maintaining of agroforestry system will be the bottom line of the evaluation for the adequacy of the construction of rural communities.

According to the change scale of the four factors above, this study proposes three acceptable reform plans for the rural communities (Table 6-14). If four mentioned elements are kept traditional, it will be the most ideal proposal for Linpan landscape preservation, which is refer to as traditional pattern.

If with the necessity of modern lifestyle, the construction pattern and plant species must be changed, but family unit, Linpan structure and agroforestry system can be maintained; it will be the more ideal Pattern 1.

If only the Linpan structure and traditional agroforestry system operation style is kept and all other elements must be changed, it will be Pattern 2.

If all other elements must be changed and only agroforestry system is kept, it will be Pattern 3, which should be the bottom line of New Village Construction affairs or

Linpan reforms.

The above rural community classification can be applied to current Linpans in Greenbelt 1 and Greenbelt 2 according to individual conditions. Also, with the combination of woods, herbs and vegetable production, and the development of the tourism function, the structure and function of rural communities can have diversed evolution and development.

In short, at the community scale, three methods are proposed for the reformation of Linpan and the construction of new villages. Adequate changes of the construction style, vegetation species, family units and the Linpan structure in traditional Linpans or new villages are recognized, but the agroforestry system as the bottom line for the traditional Linpan characteristics should try to be maintained in any case.

Table 6-14 Proposed Rural Community Pattern

Pattern	Architecture style and plant species	Family unit	Linpan Structure	Agroforestry system
Traditional	●	●	●	●
Pattern 1	changed	●	●	●
Pattern 2	changed	changed	●	●
Pattern 3	changed	changed	changed	●

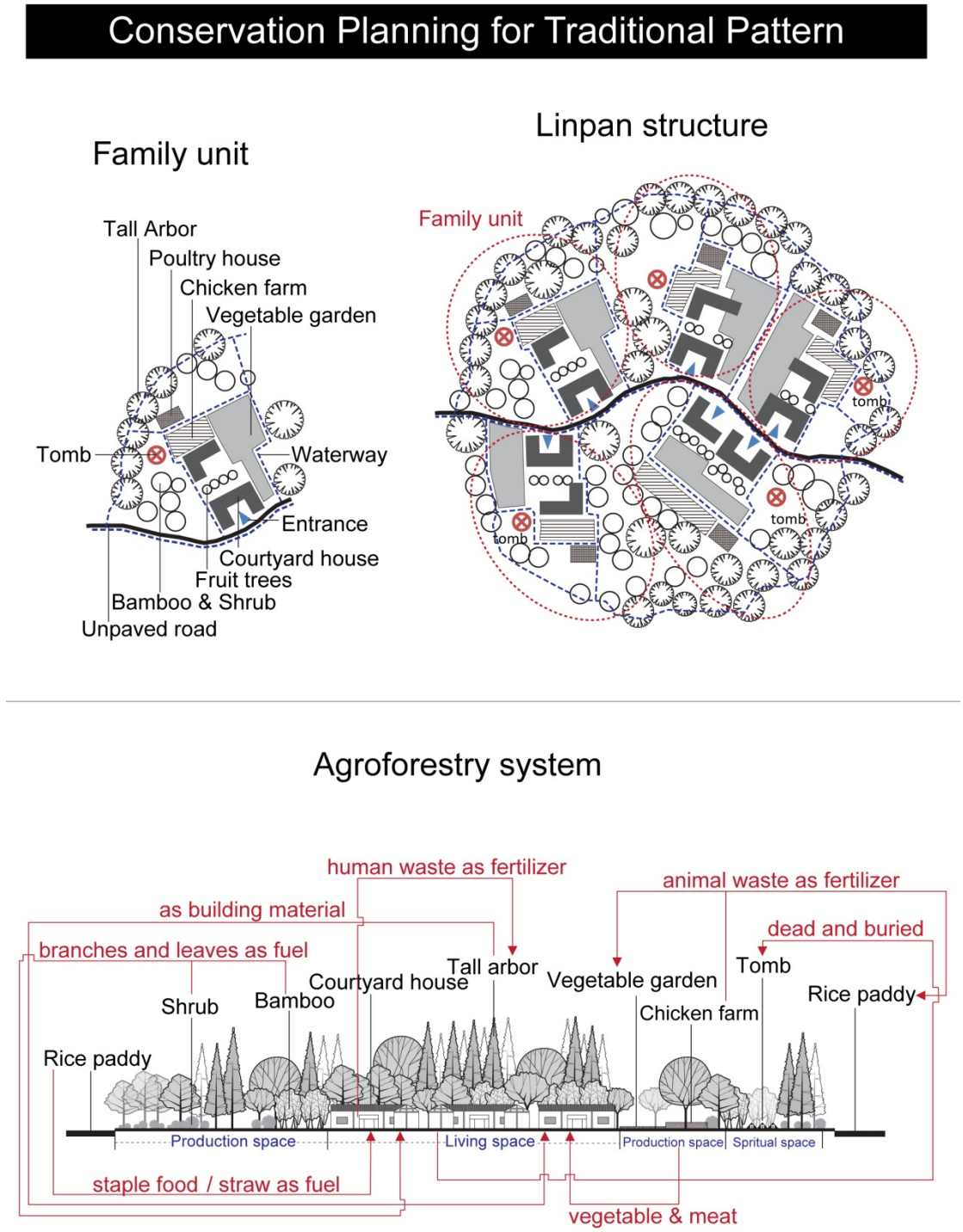


Figure 6-12 Conservation Planning for Traditional Pattern of Linpan

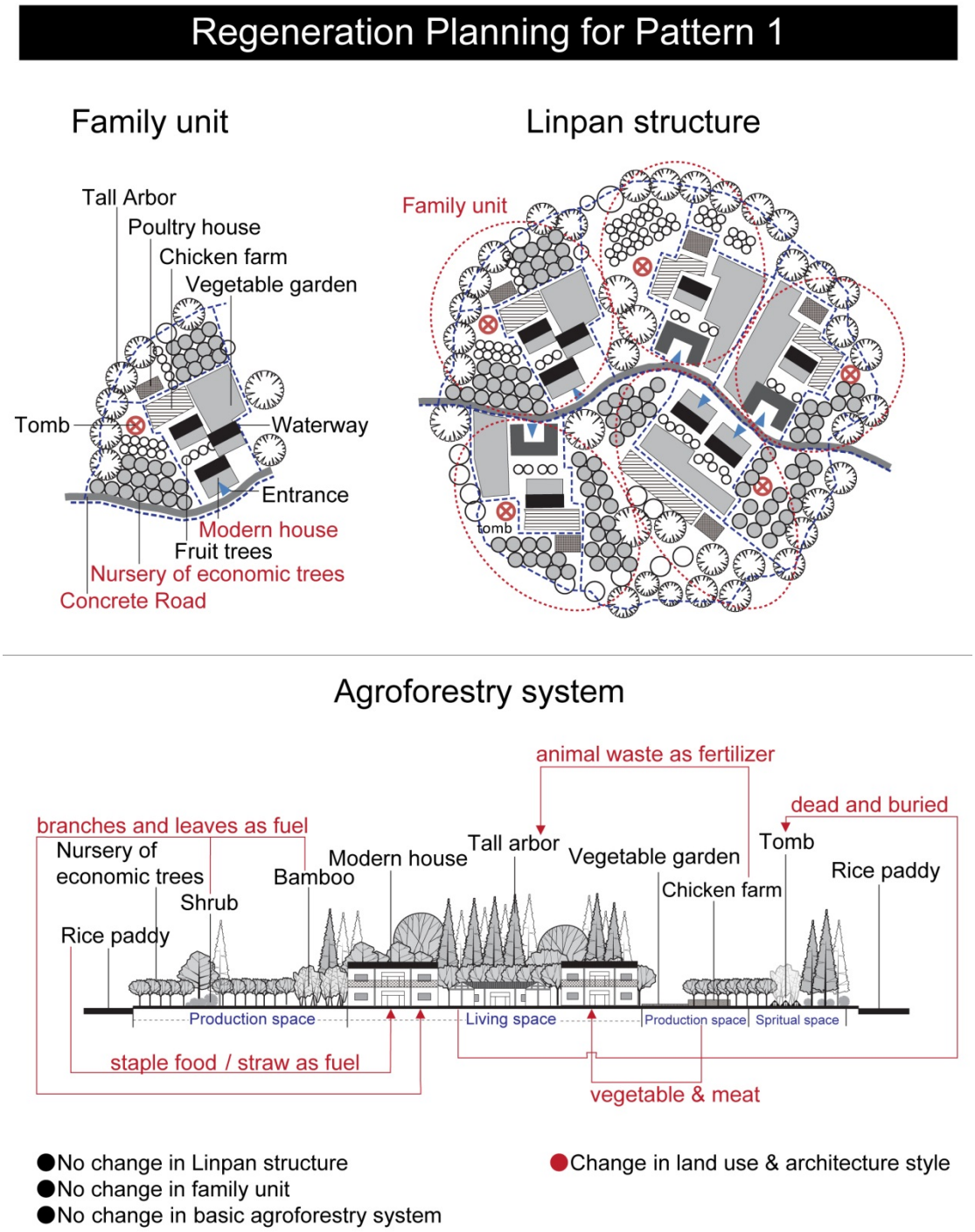


Figure 6-13 Regeneration Planning for Pattern 1 of Linpan

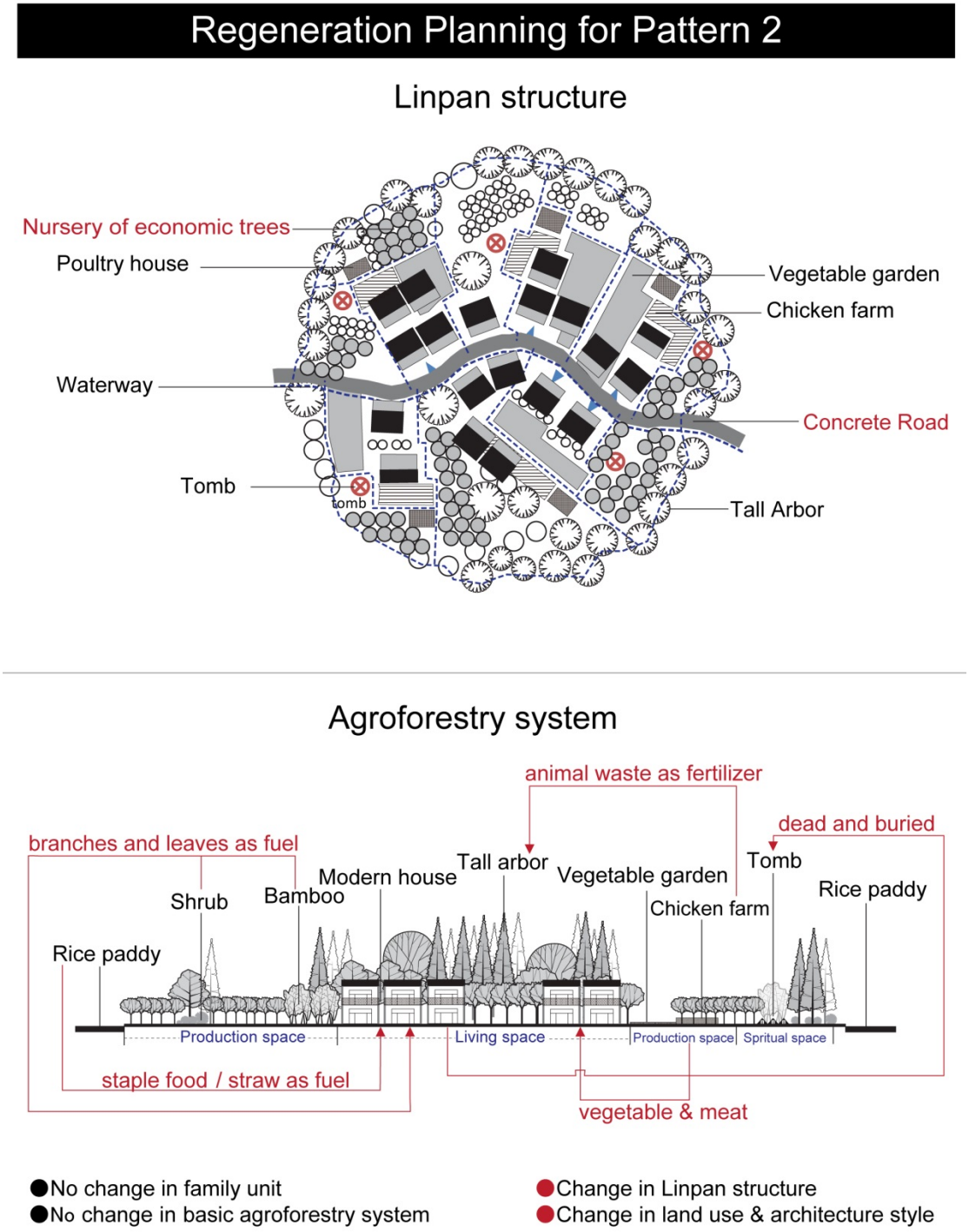


Figure 6-14 Regeneration Planning for Pattern 2 of Linpan

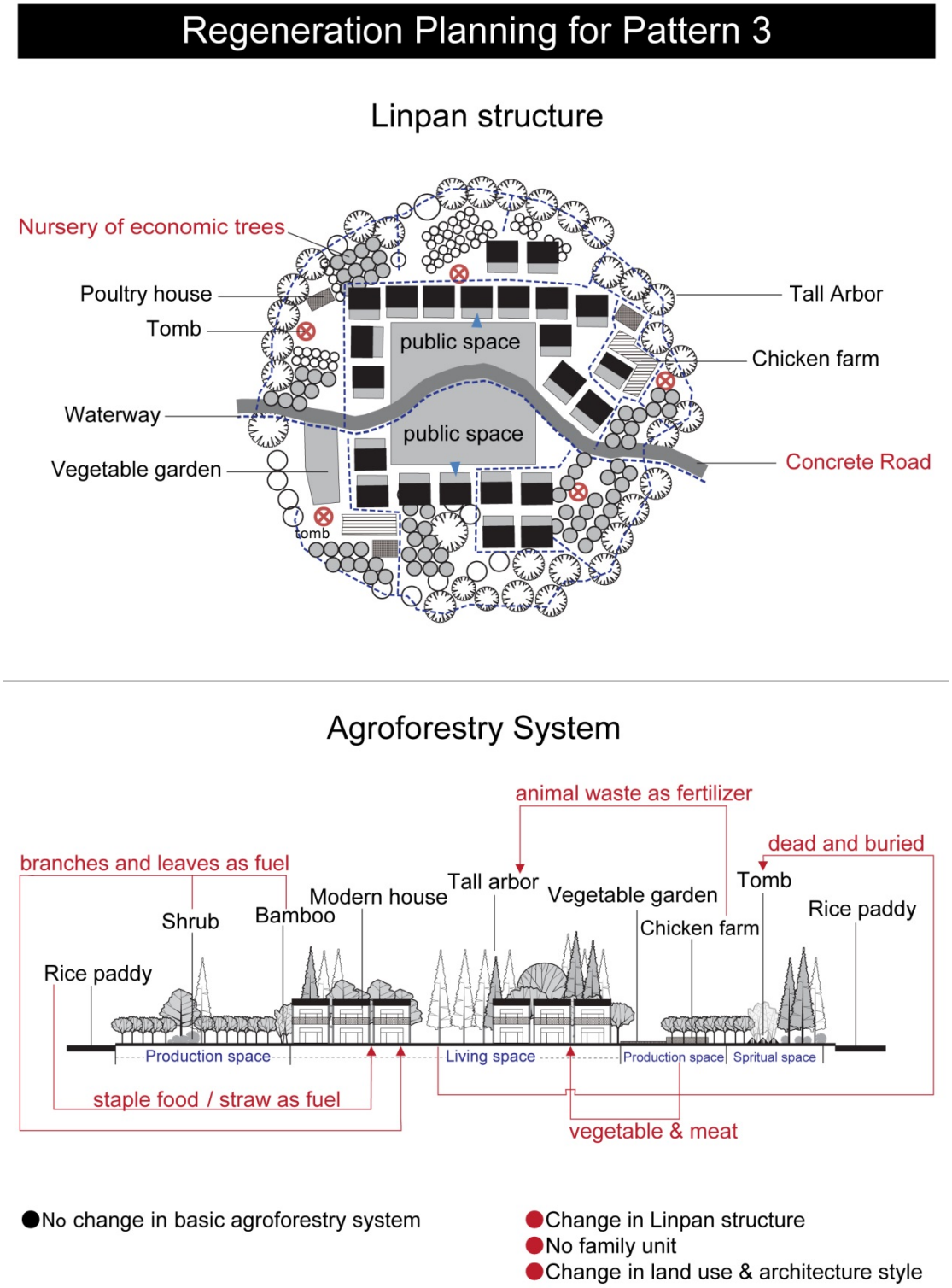


Figure 6-15 Regeneration Planning for Pattern 3 of Linpan

6.3.3 Proposed Regulations in Rural Community Scale

Based on the aforesaid analysis, this study will propose regulations for the rural community constructions to practice as the following.

▪ In the New Village Construction affairs, efforts must be bestowed on the least or no occupancy of quality farmlands to maintain same amount of farmlands and no increase in construction lands. The public opinions should be highly respected and small-scaled concentrated living style is encouraged.

▪ The selection of community public space and residential area should be combined with the current Linpans and to fully protect their conditions. New villages at larger scale are encouraged to combine with their original Linpans and separate to multiple groups in layout. The groups should not be more than 30 households in one.

▪ Avoid simple copy and paste of the urban communities layout to total areas. The layout in new villages should be diverse and comply with the lifestyles of the rural villages.

▪ Forests in new villages should be preserved as much as possible as well as the area of vegetable gardens to maintain the agroforestry system of the village.

▪ The original family unit should be maintained in new villages and to arrange households from the same family together in one living unit.

▪ In new villages, according to the separation of human and livestock convention, the farming area of animals and livestock cottages should be gathered but separate from the residential areas.

▪ In Linpans that focus on the development of tourism, rural hotels or rural tourism facilities can be established for the development of tourist industry.

▪ The building styles in new villages should use modern material to demonstrate the essence of traditional buildings and adopt more of the courtyard house style.

▪ In new villages, it is encouraged to plant woods of practical and economic function such as ornamental trees according to the local environment to fit the needs of the villagers. Common species of plants for traditional Linpan are encouraged and this study will advise against the planting of greening species that requires high cost in

caring.

6.4 Proposed Management and Construction Approaches

From a macro aspect on the region and a micro aspect on the settlements, different methods can be proposed for the conservation of rural cultural landscapes.

6.4.1 Management Approaches in Regional Scale

From a macro scale of view, the irrigation system is the foundation to the formation of landscapes and they are still functioning as the water adjustment mechanism of this area nowadays. It is found that there are still water systems that are not organized and left by the traditional agrarian era in the current irrigation system. There are banding trees along these water systems that carry the historic messages from the ancient agricultural techniques. Hence the conservation and maintenance of these systems is necessary in the following development affairs of the rural areas.

In addition, in the hierarchic road system in rural areas, secondary roads that are not reinforced should be conserved and maintain their original track direction during modern organizations.

While in the case of Linpan, with its formation based on long history, it is the cultural landscape that carries the most abundant historic messages. Hence in the New Village Construction Movement, methods that involve least changes on the building layout and location of Linpan is most preferred.

6.4.2 Construction Approaches in Community Scale

Viewing from the scale of Linpan, the planning and design of new rural communities should consider the traditional life production styles of the villagers and add small courtyards to the current building plans. Also, during the construction of new rural communities, the preservation of original large arbors should be done to enable the continual of historic messages of the Linpan.

Whereas in Mid-Modernization Era (after 2008), with the government’s coercion, the building formation, styles, room layout and plant species in nurseries are easy to be

changed. As a result, it is found that the methods for constructing new rural communities have the greatest impact on the buildings and thus the newly built buildings receive greatest challenges in inheriting the traditional characteristics of buildings in Linpan.

However, what are not easy to be changed are the large arbors on the original Linpans, the irrigation system, the road system and the organization of field blocks.

6.5 Summary

From a regional scale of view, the rural areas in fan-shape area can be divided into Greenbelt 1 and Greenbelt 2. In Greenbelt 1, the current rural cultural landscape will receive strict protection continuously. Also the nursery industry that serves to increase the income of villagers should be encouraged as well. In addition, since Greenbelt 1 is near the primary urban area, its recreational function can be further developed besides its ecological function and become the destination of rural tourism for the urban citizens.

In Greenbelt 2, also, the ecological and production function of the rural areas should be maintained with proper development of recreational function according to market demands. However, as the result of New Village Construction affairs after big earthquake in 2008, a part of the original Linpan farmers have been centralized into the new villages and they were required by government to return their homestead back to agricultural land. So it resulted in the appearance of lots of hollowed Linpan that surrounds new village and with no people living in. These hollowed Linpan have tremendous value in ecology, and they are also showing the evidence of traditional rural lifestyle. The modernization of rural lifestyle of farmers is considered to be irrevocable, and the land arrangement is also necessary for the government to increase the production efficiency. So the development activities should be allowed in Greenbelt 2, and the regeneration and conservation policy in this region could be more flexible compared to Greenbelt 1.

From a rural community scale of view, the modernization of lifestyles of the villagers in traditional Linpans is acceptable; but the New Village Construction affairs should also consider the inheritance of traditions. According to several characteristics of traditional Linpans, this study proposed three patterns adoptable for the rural

communities with hope to solve the problem of preserving the traditional lifestyle of the villagers and the cultural landscape while improving their life quality.

Chapter 7

Conclusions, Contributions & Implications

Chapter 7. Conclusions, Contributions and Implications

7.1 Concluding the Thesis

As stated in Chapter 1, the purpose of this study will be the following:

Firstly, it aims to conclude the definitions, the classifications and the characteristics of rural cultural landscape in alluvial plain of Dujiangyan City.

Secondly, it aims to explain in detail concerning the impact of modernization and the new rural improvement affairs for earthquake revival on the traditional cultural landscape of rural areas of Chengdu City conurbation.

Thirdly, the author intends to examine methodology for achieving the revival of rural areas and the sustainable development of traditional cultural landscape in Dujiangyan City.

Based on cultural landscape theories, this study focuses on the rural areas of the metropolitan area of Chengdu, China, especially on the Linpan areas in the alluvial plain (fan-shape area) of Dujiangyan City that serves as the irrigation source of the Chengdu Plain. With careful analytical discussion on the cultural landscape of the Linpans in the focus area, the value, characteristics and transition can thus be recognized and further serve as the concrete foundation for this study to propose explicit strategies for preservation of the regional-scaled rural landscape of the fan-shape area and also the community-scaled Linpan reconstruction, plans for new village development, legal regulations, design and so forth. The academic results of this study are as follows.

7.1.1 Definition and Description of Rural Cultural Landscape

Cultural landscape theories are introduced to the Linpan areas in the plains of Dujiangyan City in this study to further define and explicate the cultural landscape at Regional and community scale as following.

First of all, the Rural Cultural landscape on alluvial plain in Dujiangyan city could be

defined as “Agroforestry system and its surrounding agricultural landscape based on the World Heritage Dujiangyan irrigation waterway system. This traditional system has the flexibility in adaption to dynamic changes of modernization, while having active social role. The combination of Linpans produce evolutionary infrastructure in regional sustainability, such as ecological, recreational, economical aspects, and the evolution is still in progress”.

From a macro-scaled point of view, the cultural landscape in this area is based on the delicate irrigation canals formed by the Dujiangyan Irrigation System that has 2300-year-old historic legacy. The scattered villages established along the watercourses and the farmlands surrounding these villages are the smallest unit in the practice of sustainable land use system in this specific area. If comparing the interrelation of individual objects in the land use system in this area to the organic cell structure, the watercourses will be the capillaries, Linpan the cell nucleus and farmlands the cytoplasm. The watercourses in this area have distinctive hierarchic structure that consists of 4 levels that share various spatial relations with the Linpans.

From a community scale of view, the cultural landscape of Linpan consists of family units and the agroforestry system that utilizes diversely of the multilayer vegetation in temperate monsoon climate. Linpan serves not only as the living space, but also the agricultural and forestry production space for the villagers to lead self-sufficient lives. More than 90% of traditional Linpans are around 1ha at size that characterize the small-scaled aggregated living style.

7.1.2 Transition of Rural Cultural Landscape

This study discusses in detail on the transition of cultural landscape and lifestyles in the Linpan area of Dujiangyan City according to three respective eras.

The Traditional Agrarian Era (before 1978) is the reference era for the traditional cultural landscape characteristics. The landscape structure at regional and community scale was the result of long-term interaction between the self-sufficient lifestyle of the villagers and the natural elements. The lifestyles of the villagers had deep connection with the vegetation in the Linpan. Especially, since the demand of woods as building materials and as firewood, the maintenance and management of forests within Linpan and along the watercourse was thus important and well organized.

As the time came to the Early-Modernization Era (1978-2008), with the modernization of construction techniques, concrete and bricks were widely used, hence the decrease of the demand for large arbors from the Linpan. Tall arbors in Linpan were replaced with fruit trees or other seedlings that were of higher economic benefit. Also, with the significant economy difference between urban and rural areas, in addition to traditional Linpans, the outflow of population lead to hollowed Linpans and the tourism-oriented Linpans also appeared for the thriving rural tourism. However, the cultural landscape structure of Linpan areas was still maintained.

Since the Mid-Modernization Era (after 2008), as the post-earthquake reconstruction affairs started, primary principles for operating the new villages constructions involves the concentrated living spaces of the villagers and the transforming residential lands to farmlands. In the new villages, though with well-organized infrastructure, as the density of buildings got higher, the planting space for trees became insufficient, hence unable to maintain the original agroforestry system.

In the focus area of this study, three types of new villages were classified based on the analysis on the construction methods of the 52 new villages established. Type 1 was established based on traditional Linpan and with no expansion in area comparing to the size of original Linpan. Type 2 was a reformed work from the original Linpan that enabled a concentrated style of living with area bigger than the original Linpan size. While in the case of Type 3, large communities were established in the farmlands between Linpans to aggregate villagers from the surrounding Linpans and transforming their original residential Linpan to farmlands. Among these three types of new villages, it is obvious that Type 3 casts great influence on the traditional Linpan structure.

It is worthy of notice that from the regional scale, there is no change in the essence of the landscape structure. The same is true of the agrarian irrigation method that lasted for more than 2000 years. All detail and functional change of the landscape are for the adaptation of the modern lifestyle for the villagers. Hence the rural cultural landscape in this section is continuous in progress.

The change of production and lifestyles of the villagers is via elements such as rural lives, agriculture and transportation and finally lead to the change on landscapes. Hence with the structure of the relation between the lifestyles of the villagers and landscapes, methods for the sustainable development of cultural landscapes can thus

be found.

7.1.3 Methodology of Sustainable Development Planning of Rural Cultural Landscape

In this research, a new methodology for conservation of Rural Cultural Landscape has been provided, which is combining the Zoning Method (greenbelt) with Rural Cultural Landscape units (cluster of rural community group). The greenbelt method and policy was firstly advocated by E.Howard in 1898, which aims to solve the problem of endless urban sprawl and achieve the happy marriage of urban and rural areas. But the characteristic of original rural cultural landscape inside the greenbelt has always been neglected in regional landscape planning. So, in contemporary rural planning, it is not enough if only adopt the idea of greenbelt policy, but also the methodology of Cultural Landscape preservation inside the zoning area should be considered.

The conservation strategies for the rural areas in the focused region were proposed in this study at both regional and community scales. From a regional scale of view, referring to the government policy, the rural areas in fan-shape area can be divided into Greenbelt 1 and Greenbelt 2, and the conservation principles are provided as following.

In Greenbelt 1, the current rural cultural landscape will receive strict preservation continuously. Also the nursery industry that serves to increase the income of villagers should be encouraged as well. In addition, since Greenbelt 1 is near the primary urban area, its recreational function can be further developed besides its ecological function and become the destination of rural tourism for the urban citizens.

In Greenbelt 2, also, the ecological and production function of the rural areas should be maintained with proper development of recreational function according to market demands. However, as the result of New Village Construction affairs after big earthquake in 2008, a part of the original Linpan farmers have been centralized into the new villages and they were required by government to return their homestead back to agricultural land. So it resulted in the appearance of lots of hollowed Linpan that surrounds new village and with no people living in. These hollowed Linpan have

tremendous value in ecology, and they are also showing the evidence of traditional rural lifestyle. The modernization of rural lifestyle of farmers is considered to be irrevocable, and the land arrangement is also necessary for the government to increase the production efficiency. So the development activities should be allowed in Greenbelt 2, and the regeneration and conservation policy in this region could be more flexible compared to Greenbelt 1.

With the analysis of waterways, it is found that in the existing waterway system, two categories of waterway exist. One of which belongs to the traditional waterway, which is more curvy and wiggly. The vegetation along this kind of waterway is lush and exuberant and contains more historic messages that serve as good materials for the analysis of waterway distribution in the plain areas of Dujiangyan in ancient times. The other kind of waterway is straighter. They are basically the reorganized waterway after 1978 and the vegetation along this kind of waterway is more scattered and thinner. And it could be seen that basically the two kinds of waterways distribute in groups, so it could be considered as the base of classification of rural community clusters.

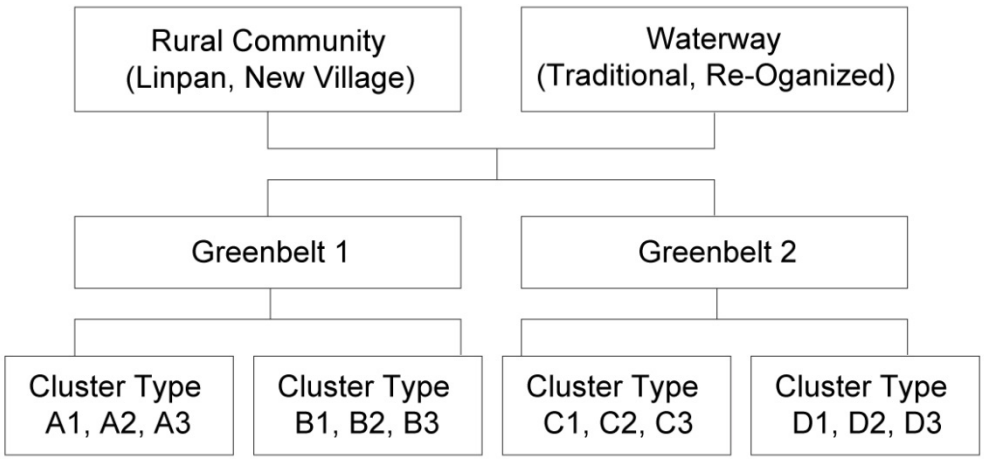


Figure 7-1 Conservation Strategy of Rural Cultural Landscape in Regional Scale

As a result, according to the historic time difference of the formation of waterways and the distribution of the existing traditional Linpans and the new villages, this study found out the cluster of these settlements combination as the basic unit for the rural cultural landscape conservation and sustainable development strategy.

At the same time, in regional scale, the Zoning (Greenbelt) could be considered as the matrix, waterway network as corridor, and the rural community cluster as the core. So

the methods of Landscape Ecology could also be applied in this fan-shape area.

First of all, the matrix could be seen as Greenbelt 1 and Greenbelt 2. And the traditional and re-organized waterway (corridor) networks contribute to the base of cluster classification.

Table 7-1 Sustainable Development Planning Methodology of Rural Cultural Landscape in Regional Scale

<table>
<tr><th></th><th colspan="5">Linpan & New Village (Core)</th><th colspan="2">Waterway Network (Corridor)</th><th colspan="2">Zoning(Matrix)</th></tr>
<tr><th>Cluster Type</th><th>Agrarian Linpan</th><th>Tourism-oriented linpan</th><th>Special Industry Linpan</th><th>Ecological Linpan</th><th>New Village</th><th>Traditional (winding)</th><th>Re-organized (straight)</th><th>Greenbelt 1</th><th>Greenbelt 2</th></tr>
<tr><td>A1</td><td>●</td><td>●</td><td></td><td></td><td></td><td rowspan="3">●</td><td rowspan="3"></td><td rowspan="6">●</td><td rowspan="6"></td></tr>
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</table>

Then, the regeneration planning methods of combination of rural community with different function could be applied and totally 12 types of Cluster Type (core) has been provided.

For example, in Greenbelt 1, the Agrarian Linpan together with Tourism-oriented Linpan and the traditional winding waterway consist of Cluster Type A1, which is recreational cluster, and the preservation policy and rural tourism development regulations should be applied together. While, the Agrarian Linpan together with Special Industry Linpan and traditional waterway consist of Cluster Type A2, which could be seen as the new rural industry cluster. Besides, the New Village together with hollowed (ecological) Linpan in surrounding, and the traditional waterway consist of Cluster Type A3, and this could been considered as the new development idea in this region.

Basically, the combination of “Agrarian + Tourism-oriented Linpan”, “Agrarian + Special Industry Linpan” and the “New Village + Ecological Linpan” would be the three major types of cluster designation. And the total 12 types of Cluster should be

applied into the whole fan-shape area to identify and carry out the different conservation and management regulations in order to achieve the sustainable development.

On the other hand, from the perspective of community scale, basically the Linpan is the smallest unit inside the combination of rural communities (cluster). In traditional Linpan, the relatives of farmers usually live close to each other, which formed family units inside of Linpan. The layout of family units formed the structure of Lipan. Besides, the self-sufficient rural lifestyle resulted in a sophisticated agroforestry system, which became the biggest characteristic and also the essence of Linpan. So, in preservation and regeneration planning of individual Linpan, the agroforestry system should be emphasized and revitalized.

Table 7-2 Sustainable Development Planning Methodology of Rural Cultural Landscape in Community Scale

Pattern	Architecture style and plant species	Family unit	Linpan Structure	Agroforestry system
Traditional	●	●	●	●
Pattern 1	changed	●	●	●
Pattern 2	changed	changed	●	●
Pattern 3	changed	changed	changed	●

In this research, three patterns are proposed for the regeneration works of Linpan and the construction of new villages. Basically the three patterns are combination of the four elements of “Architecture Style and Plant species + Family Unit + Linpan Structure + Agroforestry System”. The ideal pattern is to preserve all these traditional elements, but the modernization of farmers’ lifestyle should be allowed, so it is important to show clearly what kind of change should be tolerated in order to revitalize the rural community, and what is the bottom line of change concerning the preservation of Linpan cultural landscape legacy. So these patterns are options that government and farmers could adopt in regeneration projects according to different needs or current situations.

In short, the adequate changes of the construction style, vegetation species, family units and Linpan structure in traditional Linpans or new villages are recognized, but

the agroforestry system as the bottom line for the traditional Linpan characteristics should be maintained in any case.Due to different levels on difficulties to the changes of life production styles of the villagers, some landscape elements are easier to be altered while some are not, hence the backbones of the inheritance of traditional landscape characteristics.

7.2 Contributions of This Research

The academic results in this study are the first in this field in China concerning the characteristics and transition of Linpan areas in Dujiangyan City, especially concerning the New Village Construction Movement affairs after the 2008 earthquake in Dujiangyan City.

This study demonstrated academic originality concerning the explication of the Linpan area in Dujiangyan City with cultural landscape theories, the analysis of cultural landscape at local and community scale, and the proposal of macro and micro scaled preservation management strategies. The research methods and preservation strategies in this study can be efficiently applied to other rural areas in plains of China.

1. From the subject, this study is the first academic research recognizing the value of rural cultural landscape of a wide range of areas in the city of Chengdu and analyzes regular rural views from a cultural landscape perspective. Also, this study focuses not only on the significance of world heritage level cultural landscape, but also emphasizes the vulnerability of sustainable development in those regular rural landscapes.

2. From the scale, although there are studies concerning the rural areas (forests) of Chengdu City conurbation, most of these studies take the downtown, surrounding counties and cities as subject and none of them had conducted systematic research on the rural areas of Dujiangyan City that has been the foundation of cultural landscape of Chengdu City. Further, it is found that very few previous studies had taken the cultural landscape theories into the analysis and discussion of rural landscape in Dujiangyan City. This study is hence novel.

3. From the methodology, this study applied sufficient technical means such as GIS, GPS and Google Earth to generate accurate maps for land use and other themes to

understand the distribution of village settlements and its connection with the watercourse. These maps of high precision also serve to the analysis and measurement of the rural cultural landscape composition at macro and micro scales. These data will serve as reliable reference for subsequent studies.

7.3 Future Research

The Linpan areas located in Chengdu Plain is vast and spacious. This study takes a particular focus on the Linpan area in Dujiangyan City, hence some limitation are drawn on the scale. Also, it should be noticed that the rural cultural landscape range covers not only the plain area itself. With the limitation of the terrain, some of the rural cultural landscapes in mountain areas in Dujiangyan City also demonstrate distinctive characteristics. Therefore, the follow-up of this study will be carried out in this line of thinking.

Concerning the cultural landscape research focusing in this specific region, explicit analysis on the irrigation watercourse system other than merely on the Linpan and also on other cultural landscape elements thus accompanied of their ecological function evaluation can be the follow-up concentrations in this field. Also, instead of limiting to the cultural landscape of Linpan areas in Dujiangyan City, it is necessary to extend the research scale to other sections of China. In China, systematic preservation schemes do not currently exist. This study is thus important for the cultural landscape research field in China for the better development in the future.

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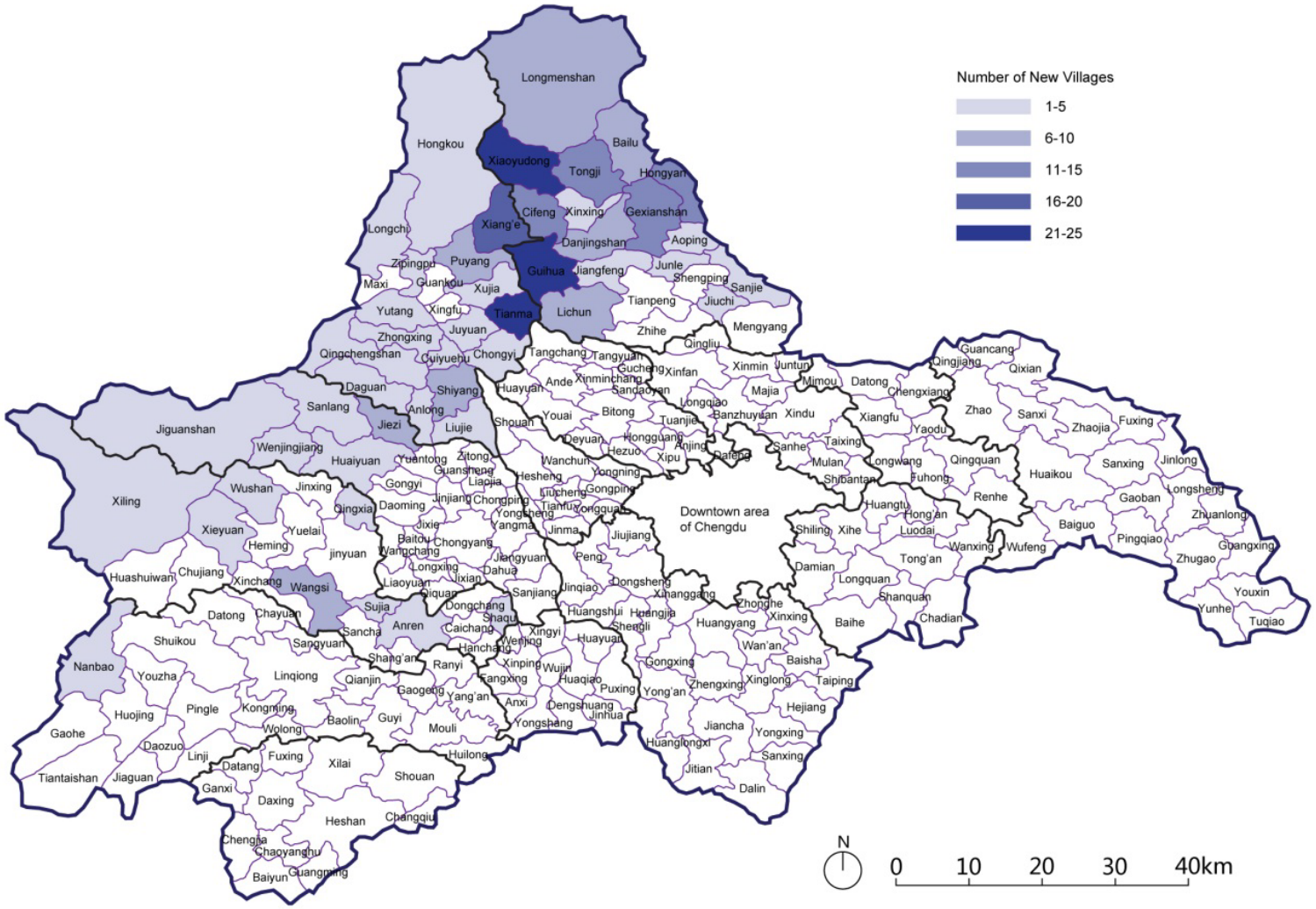
Appendices

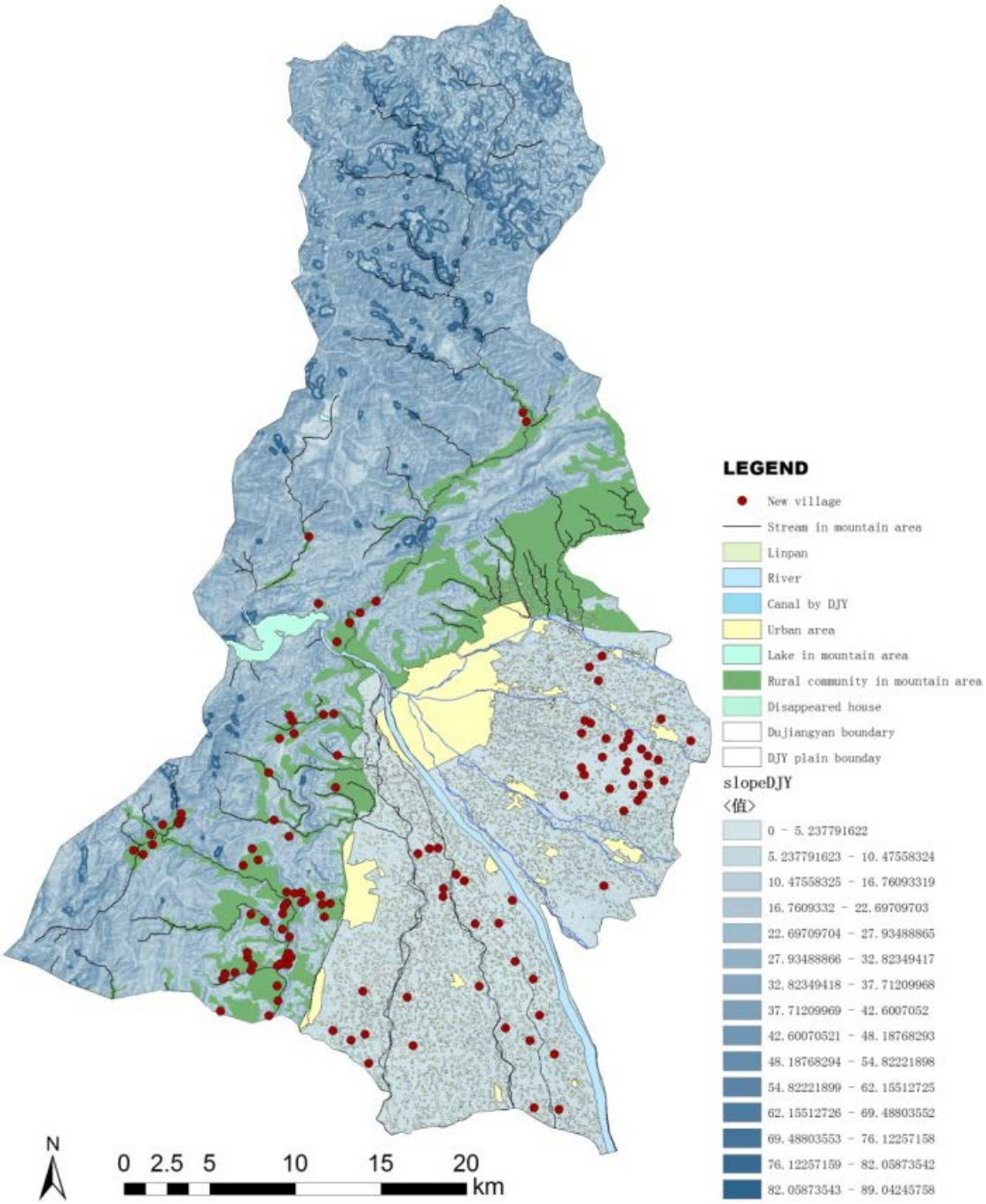
1）New Village projects in Chengdu & Dujiangyan

2）Data Sheets of 52 New Village

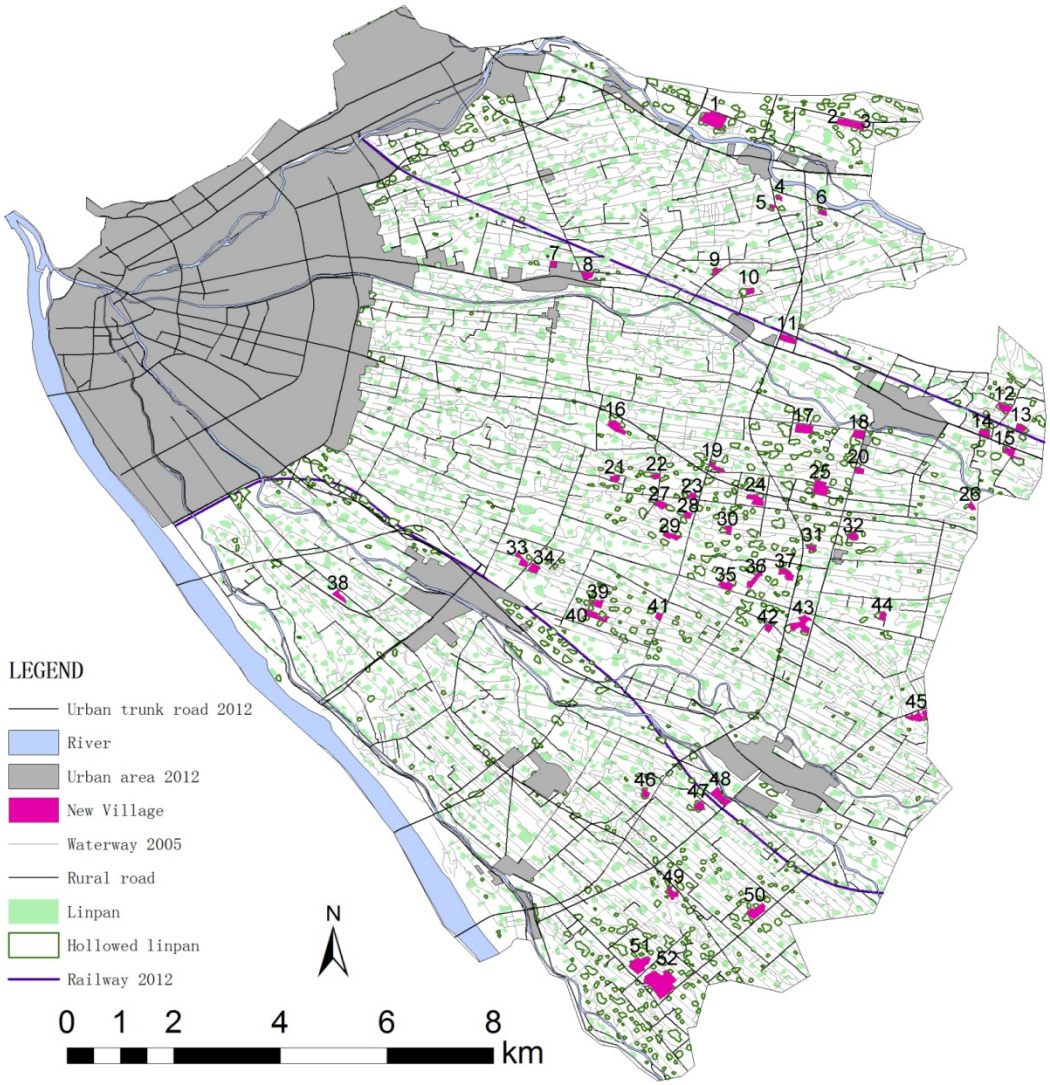
3）Questionnaire in Field Survey



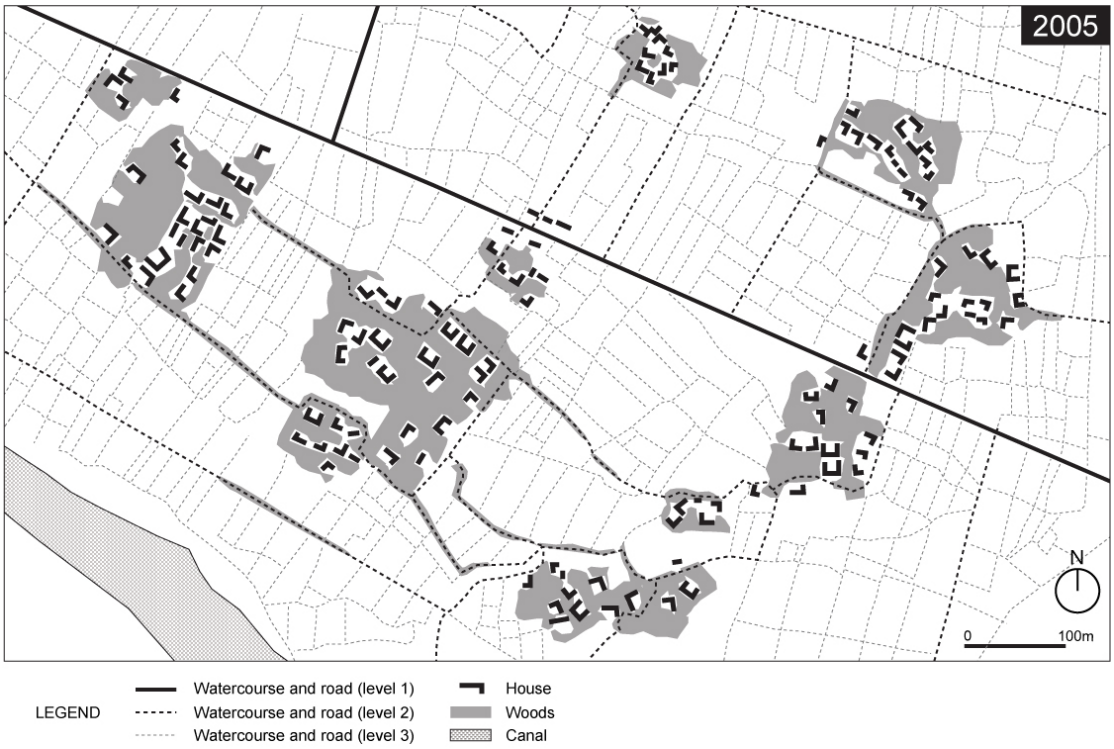
New Village Construction Project in Metropolitan Area of Chengdu

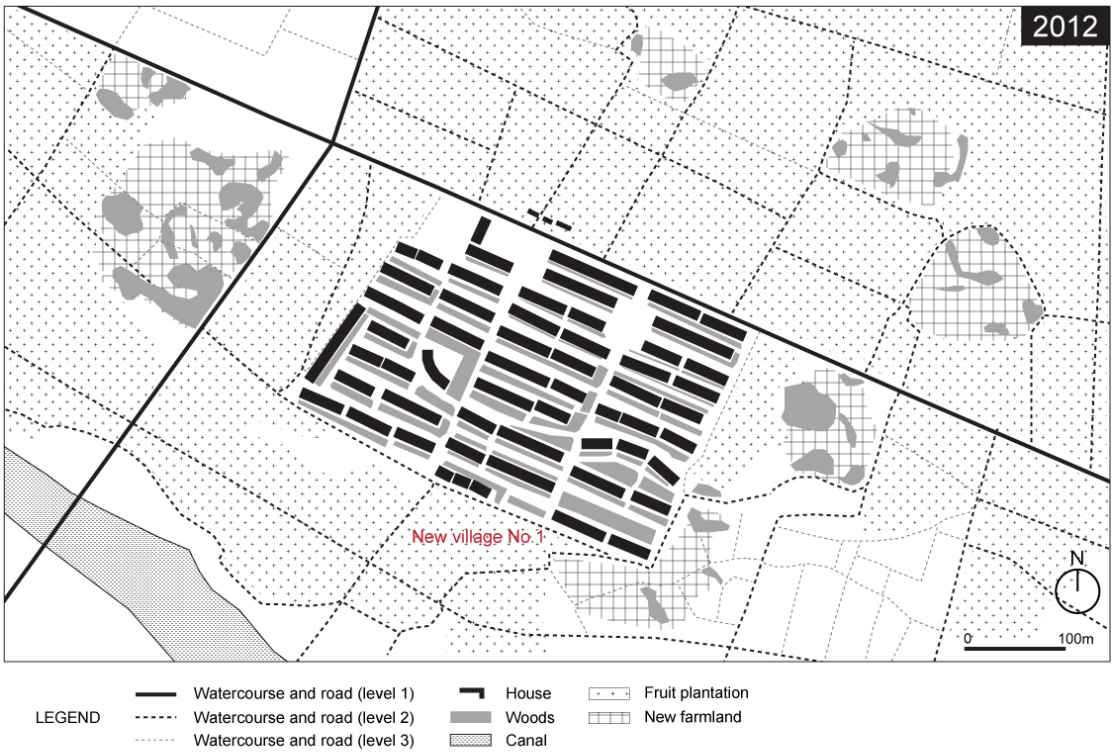


New Village Construction Project in Dujiangyan City



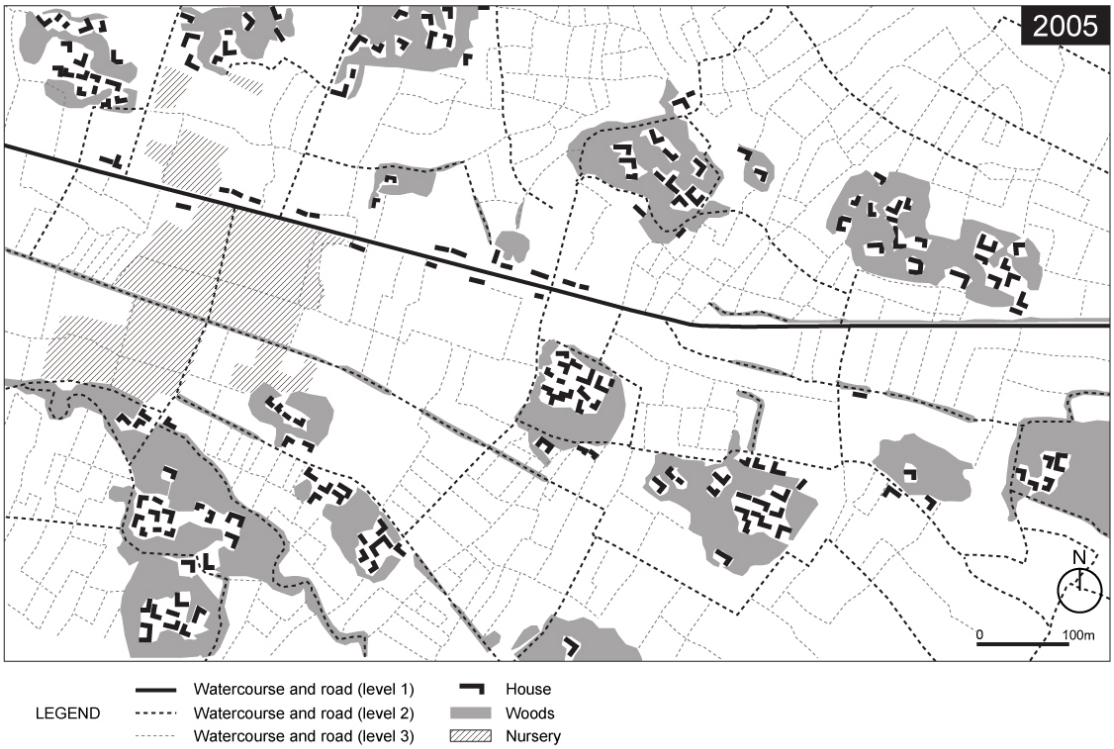
Location of New Village in Fan-shape Area

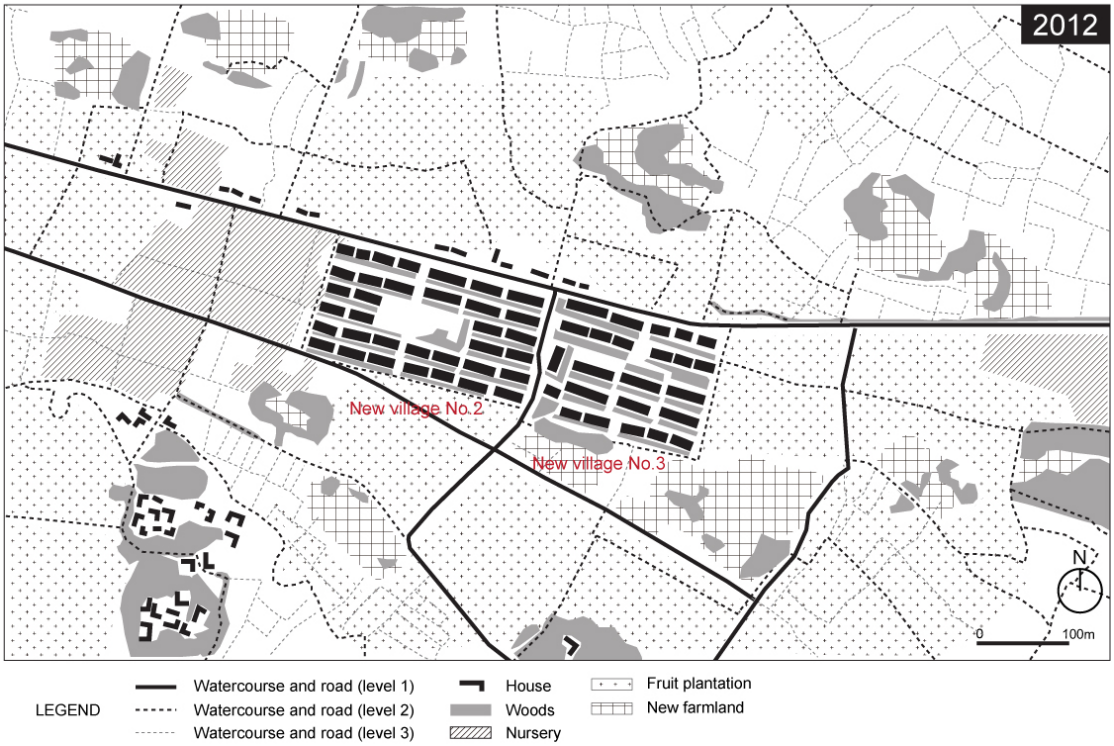




New Village No.	Perimeter(m)	Area(ha)	Household number	Building area(ha)	Building coverage ratio(%)
1	1256.15	9.30	291	5.24	56.37

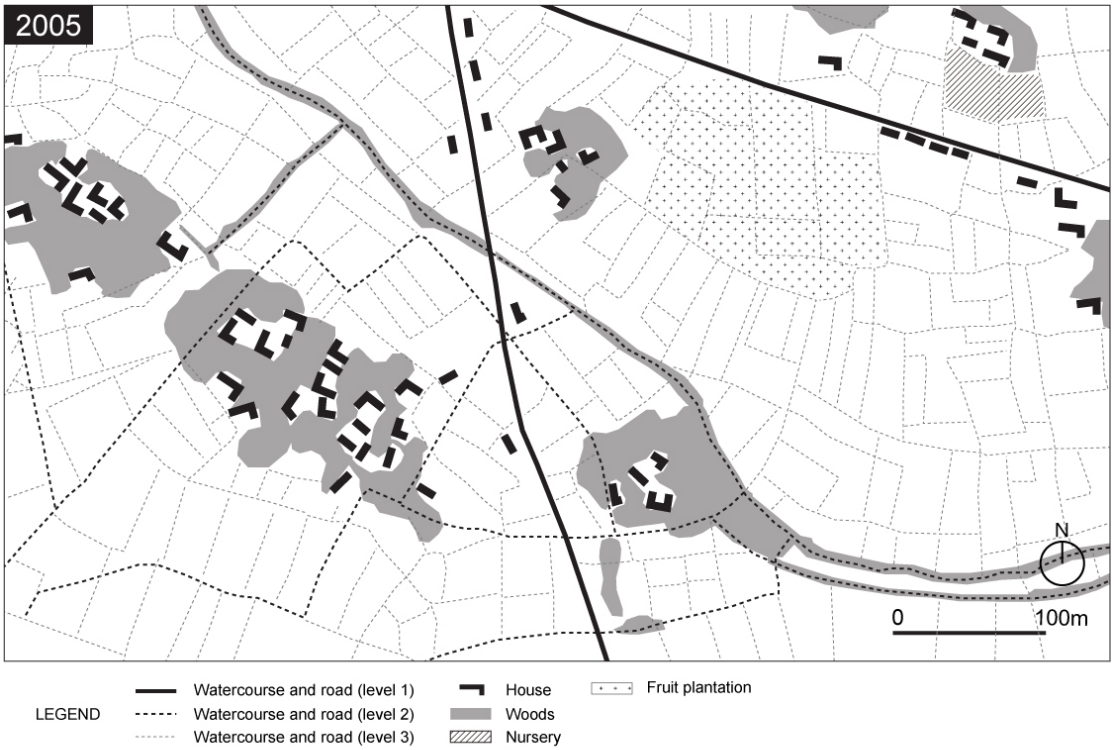
New Village No.1

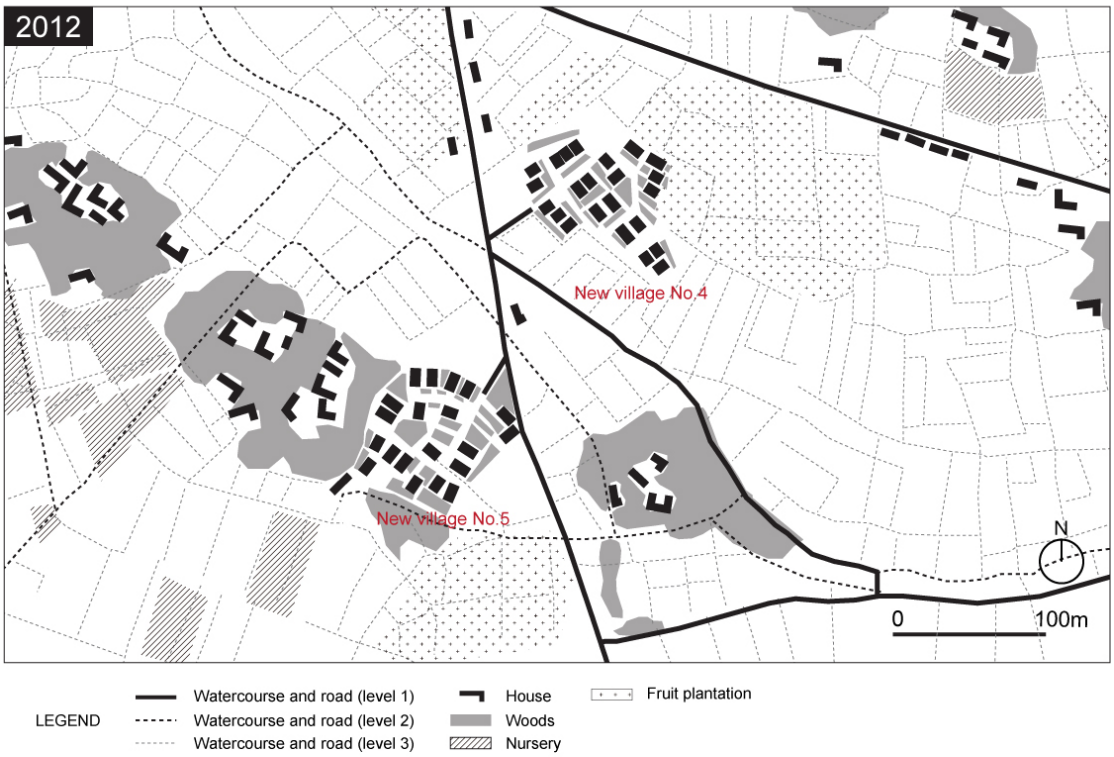




New Village No.	Perimeter(m)	Area(ha)	Household number	Building area(ha)	Building coverage ratio(%)
2	764.29	3.12	91	1.63	52.36
3	634.17	2.45	74	1.34	54.72

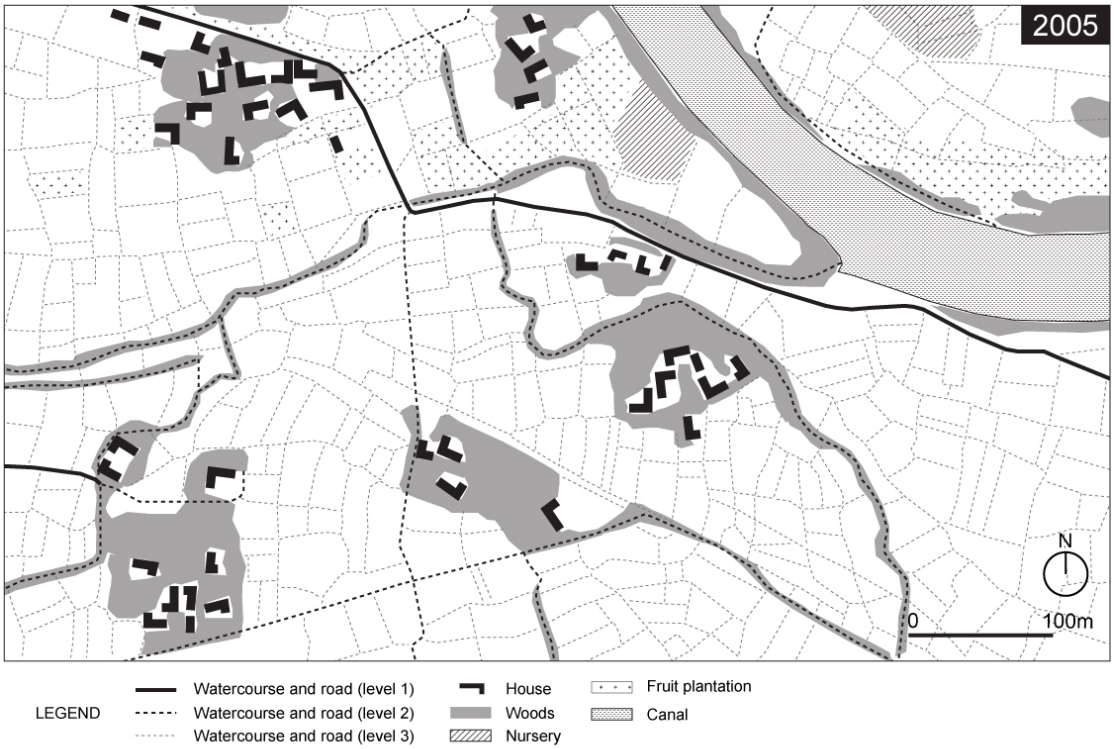
New Village No.2 and No.3

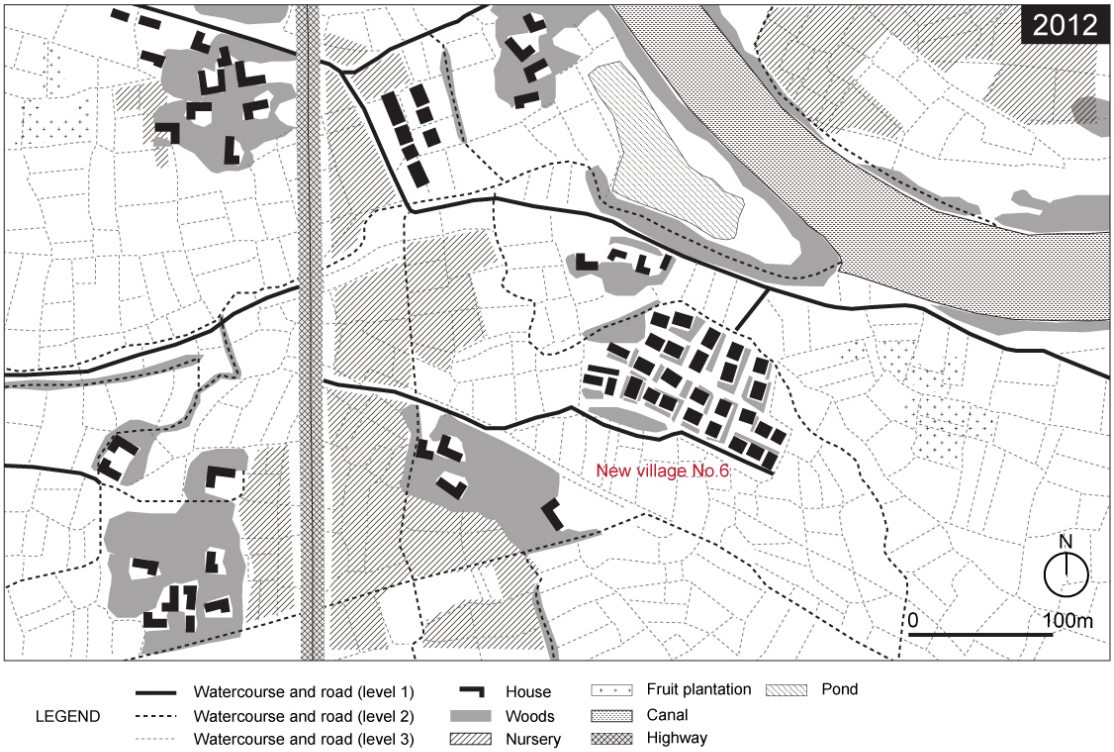




New Village No.	Perimeter(m)	Area(ha)	Household number	Building area(ha)	Building coverage ratio(%)
4	376.57	0.75	39	0.36	47.38
5	318.82	0.68	35	0.31	46.21

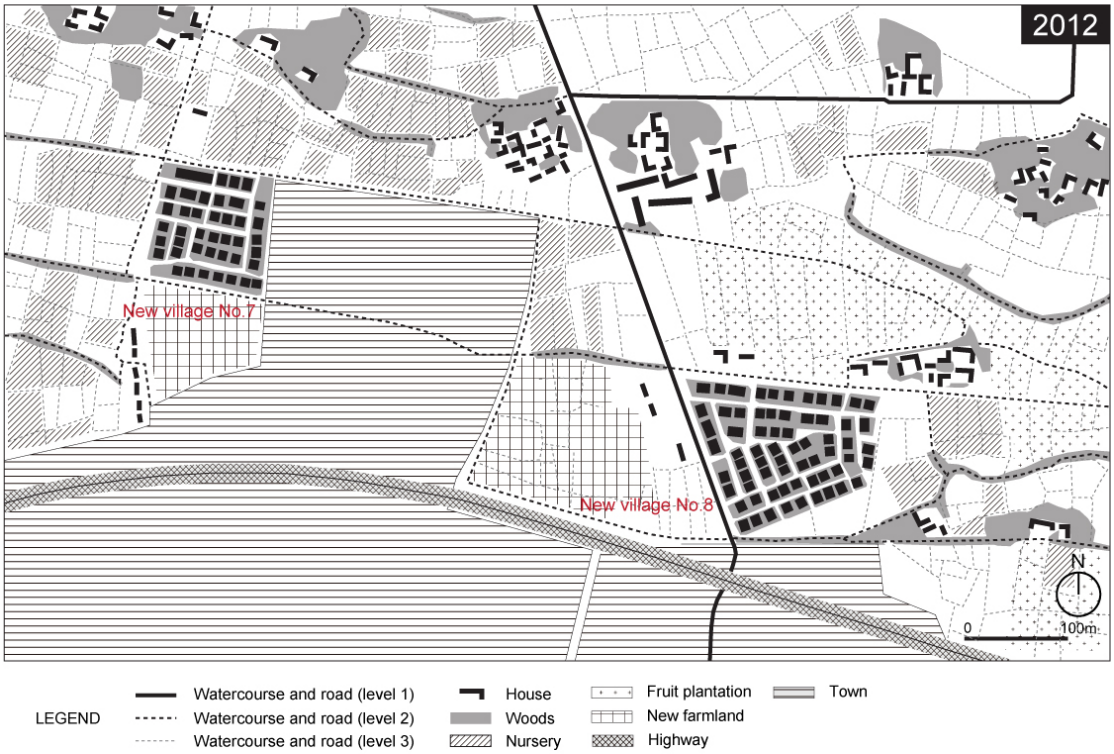
New Village No.4 and No.5





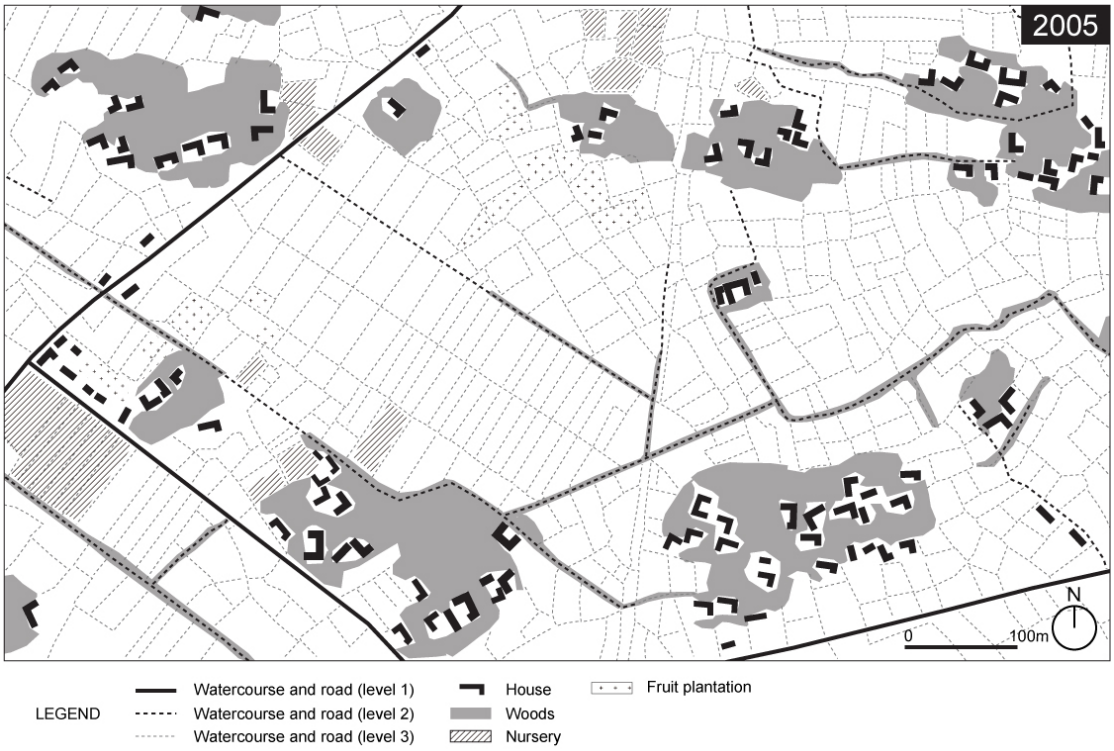
New Village No.	Perimeter(m)	Area(ha)	Household number	Building area(ha)	Building coverage ratio(%)
6	451.25	1.10	53	0.48	43.74

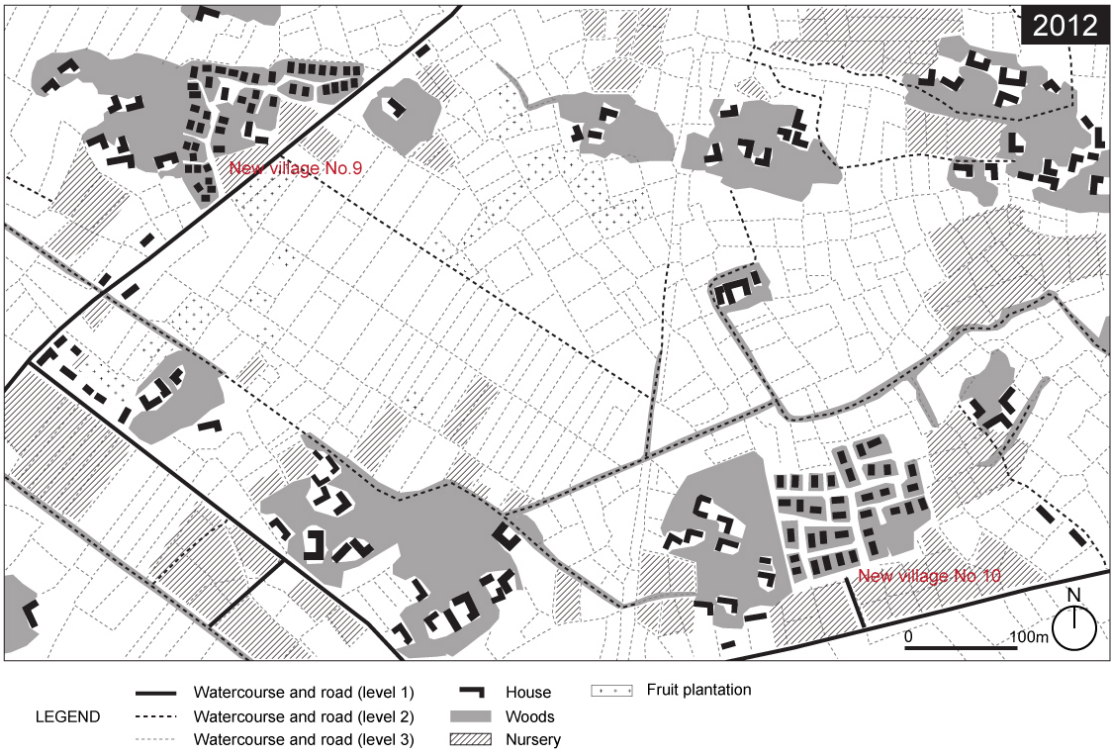
New Village No.6



New Village No.	Perimeter(m)	Area(ha)	Household number	Building area(ha)	Building coverage ratio(%)
7	438.13	1.20	69	0.62	51.98
8	601.15	2.12	138	1.24	58.43

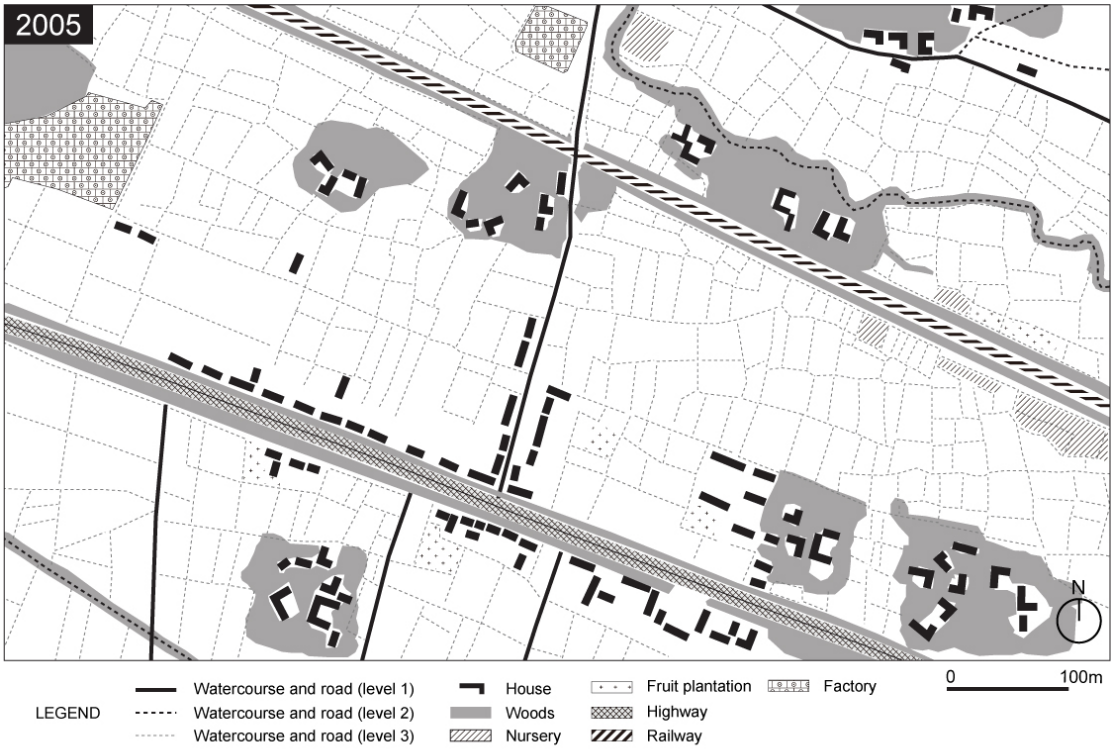
New Village No.7 and No.8

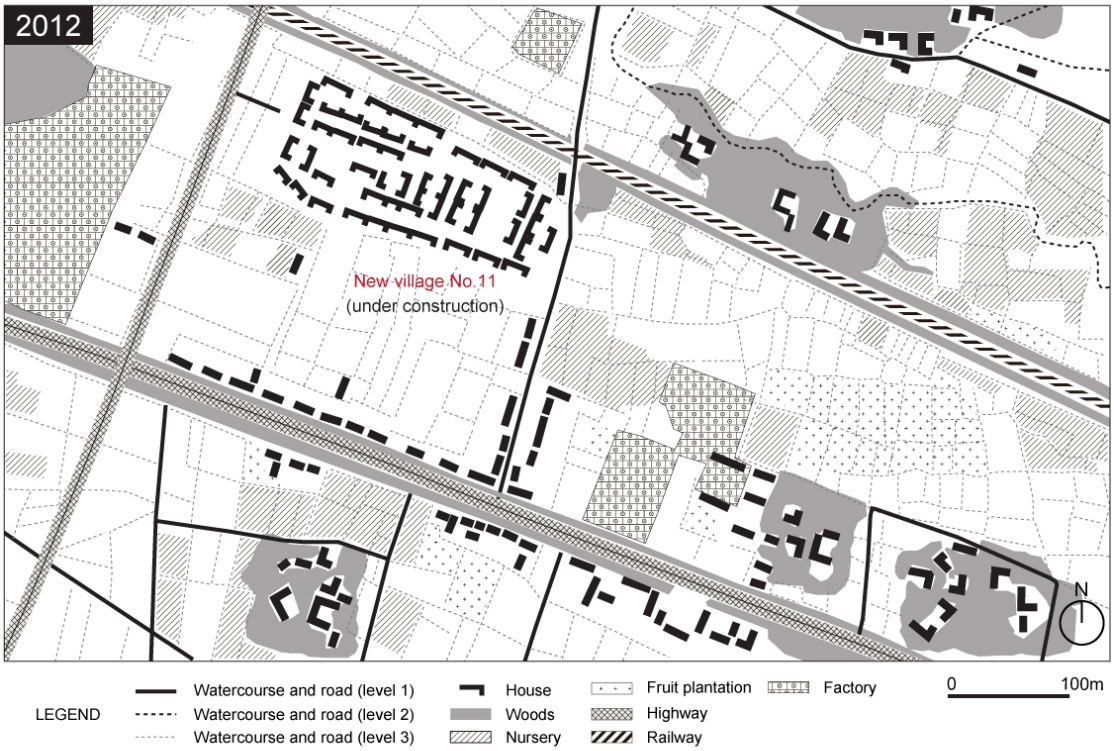




New Village No.	Perimeter(m)	Area(ha)	Household number	Building area(ha)	Building coverage ratio(%)
9	613.79	1.36	78	0.70	51.39
10	485.98	1.32	70	0.63	47.46

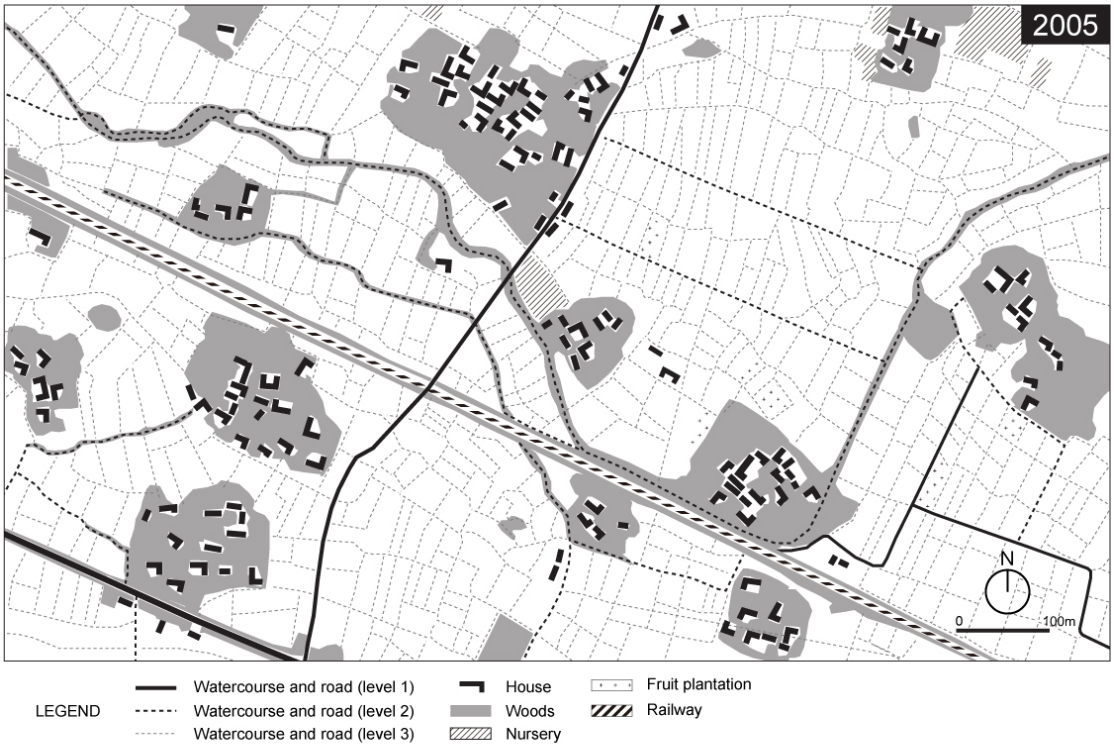
New Village No.9 and No.10

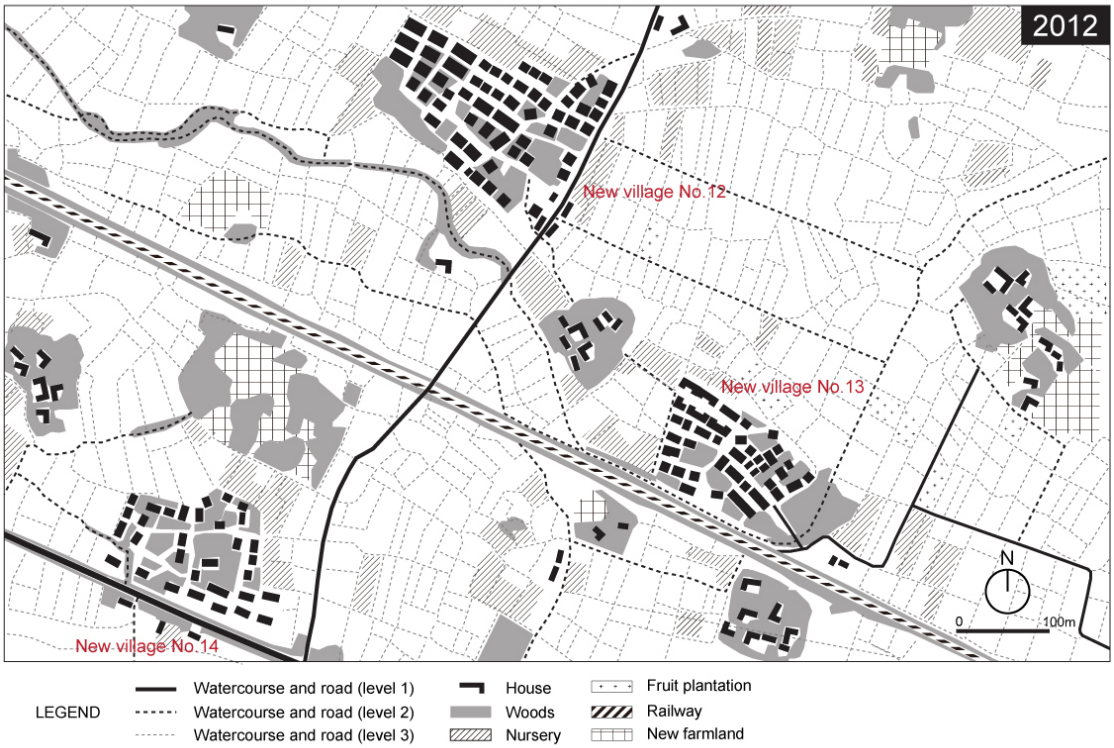




New Village No.	Perimeter(m)	Area(ha)	Household number	Building area(ha)	Building coverage ratio(%)
11	757.67	2.90	133	1.59	54.87

New Village No.11



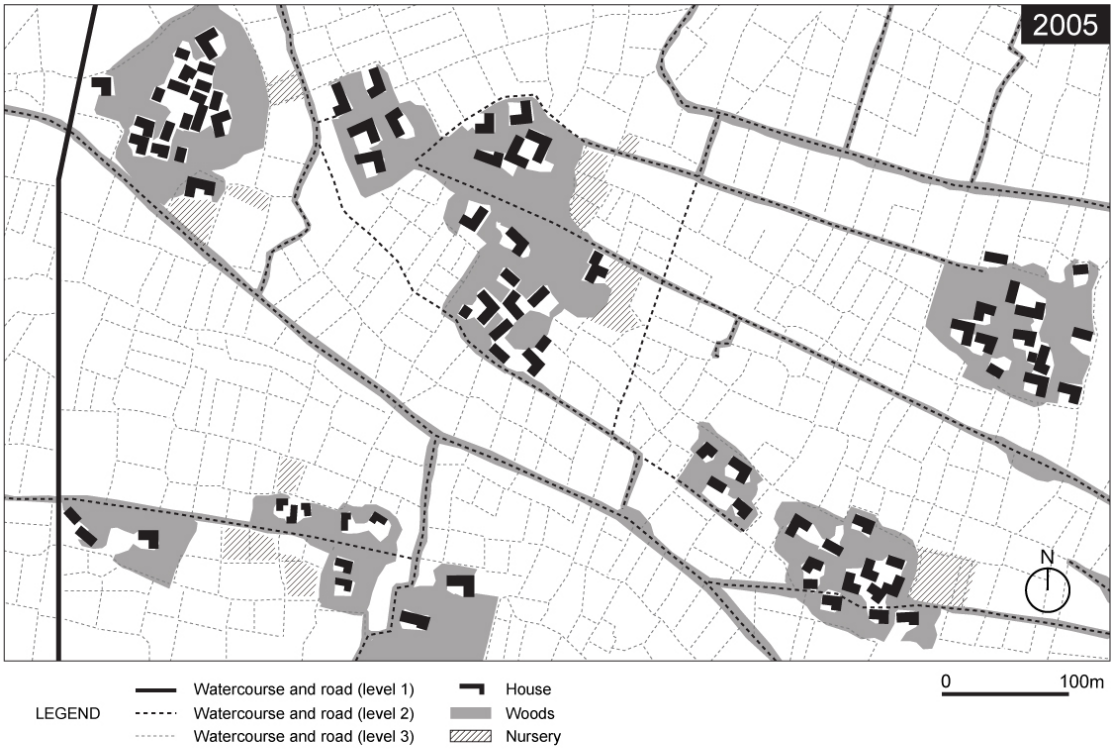


New Village No.	Perimeter(m)	Area(ha)	Household number	Building area(ha)	Building coverage ratio(%)
12	766.06	2.68	129	1.55	57.74
13	516.85	1.74	93	1.11	63.89
14	610.77	1.99	74	0.89	44.87

New Village No.12, No.13 and No.14

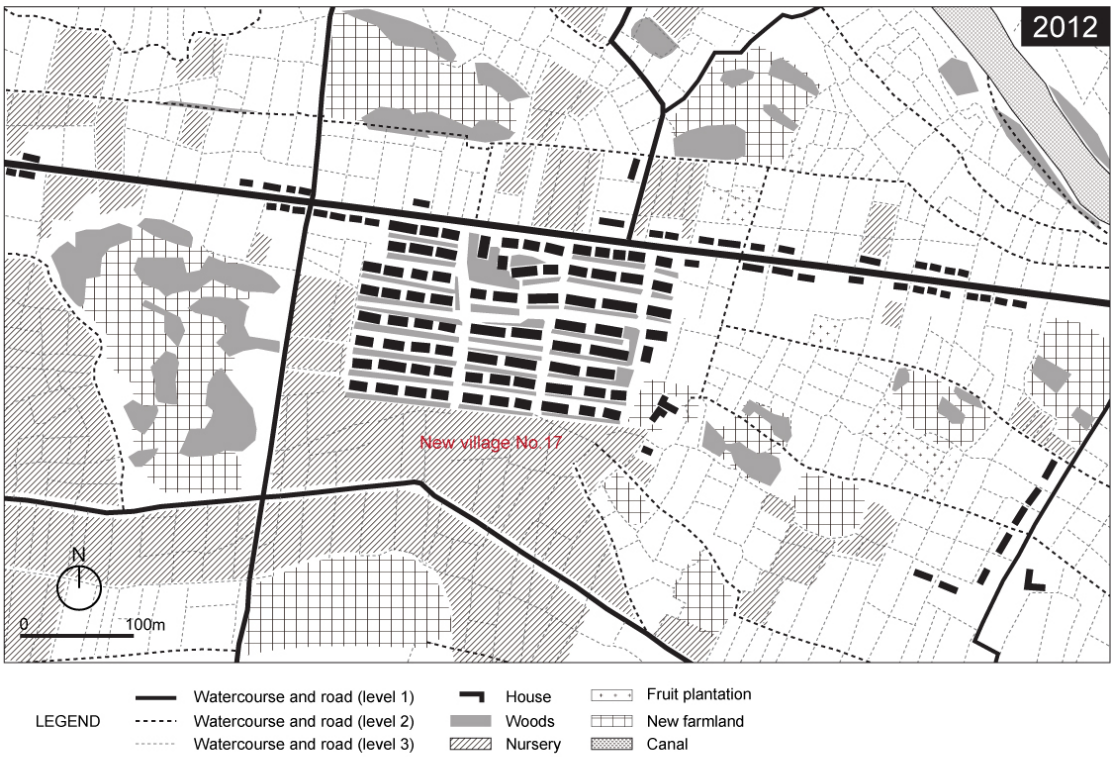
New Village No.	Perimeter(m)	Area(ha)	Household number	Building area(ha)	Building coverage ratio(%)
15	911.82	2.50	107	1.28	51.12

New Village No.15



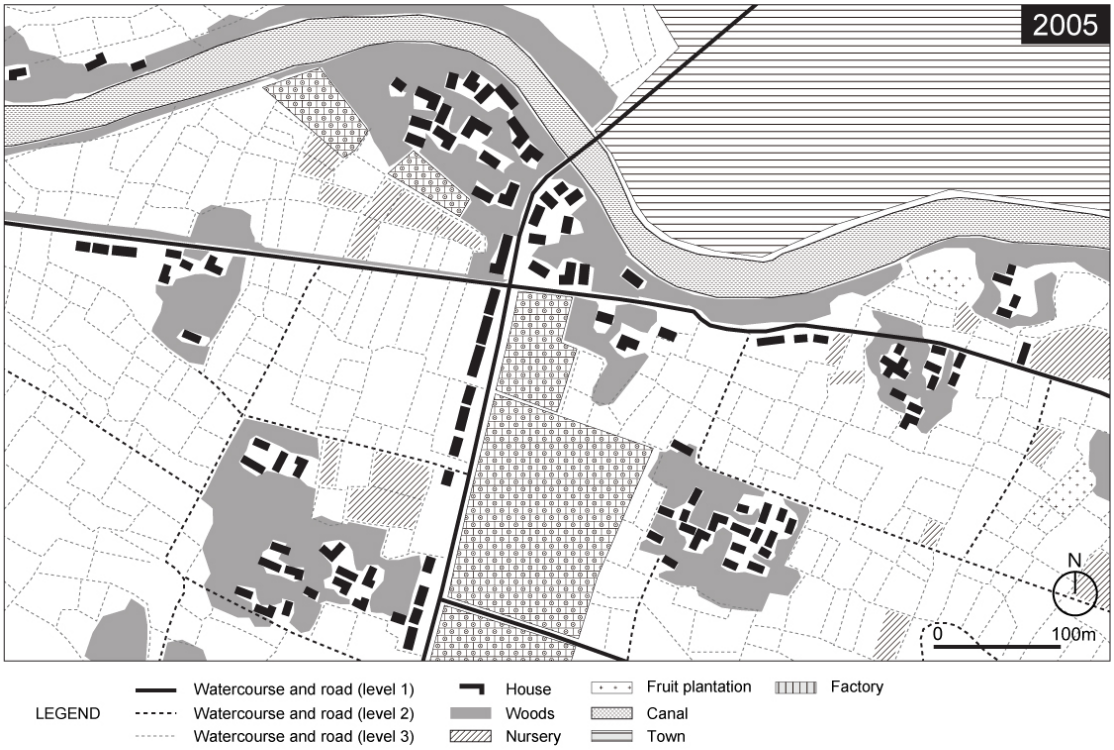
New Village No.	Perimeter(m)	Area(ha)	Household number	Building area(ha)	Building coverage ratio(%)
16	973.08	3.84	207	2.49	64.79

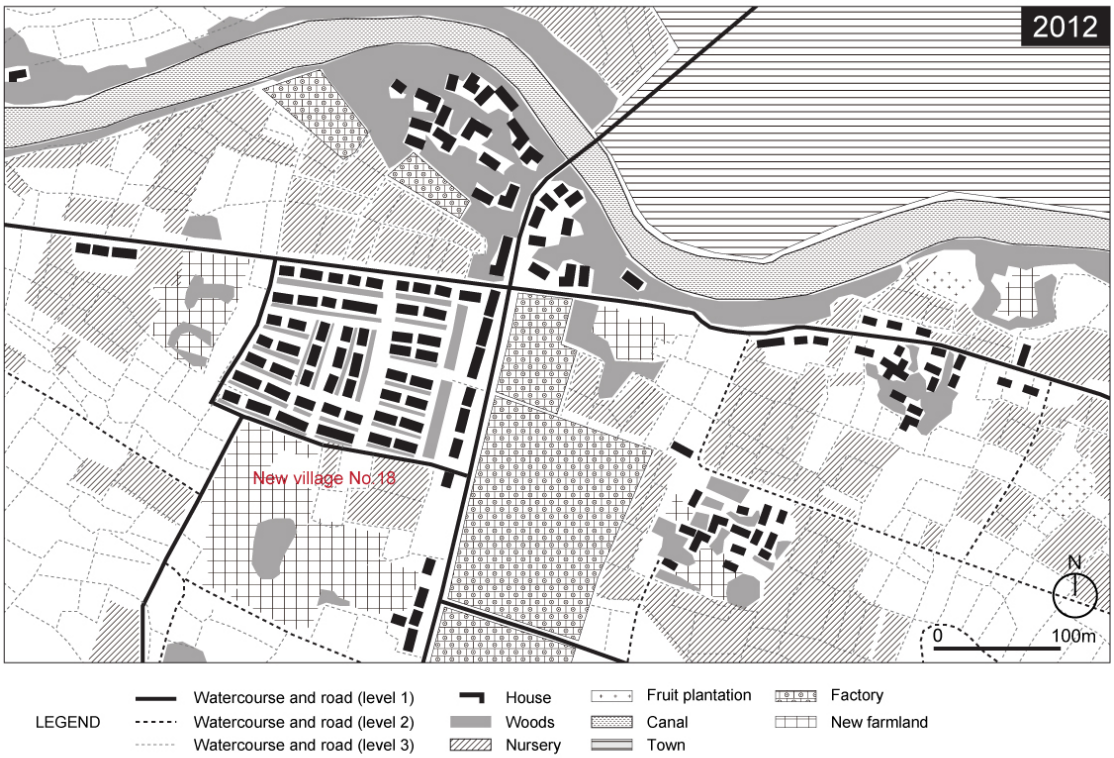
New Village No.16



New Village No.	Perimeter(m)	Area(ha)	Household number	Building area(ha)	Building coverage ratio(%)
17	877.70	4.42	220	2.64	59.76

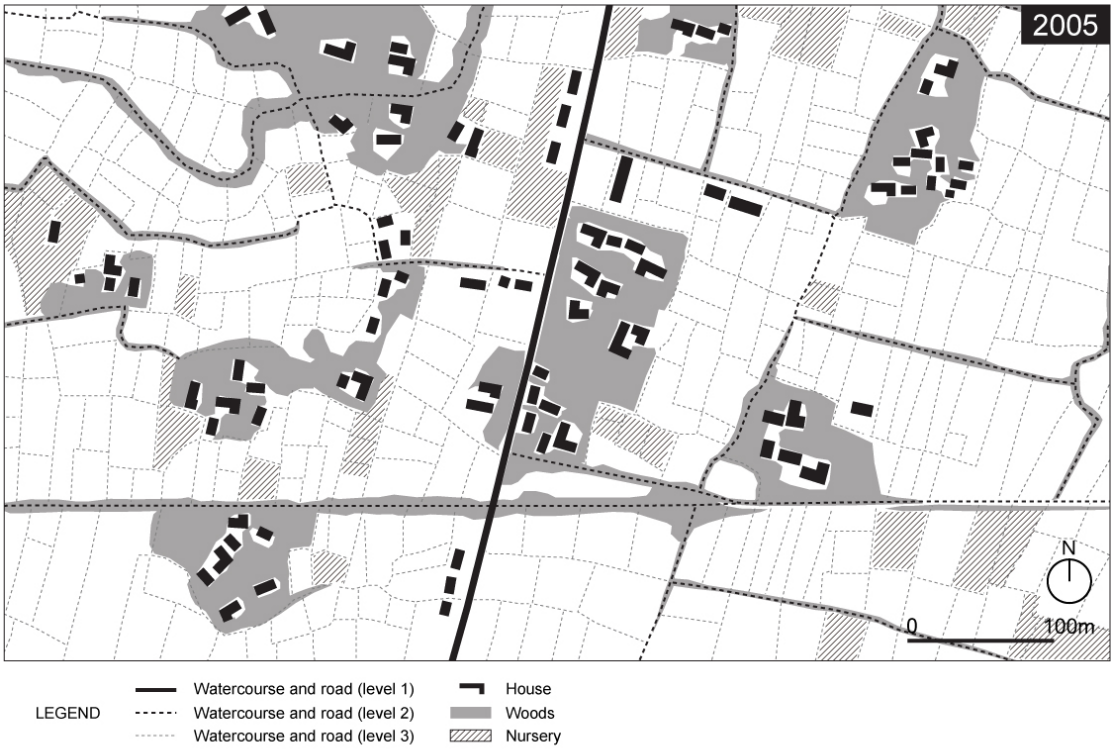
New Village No.17

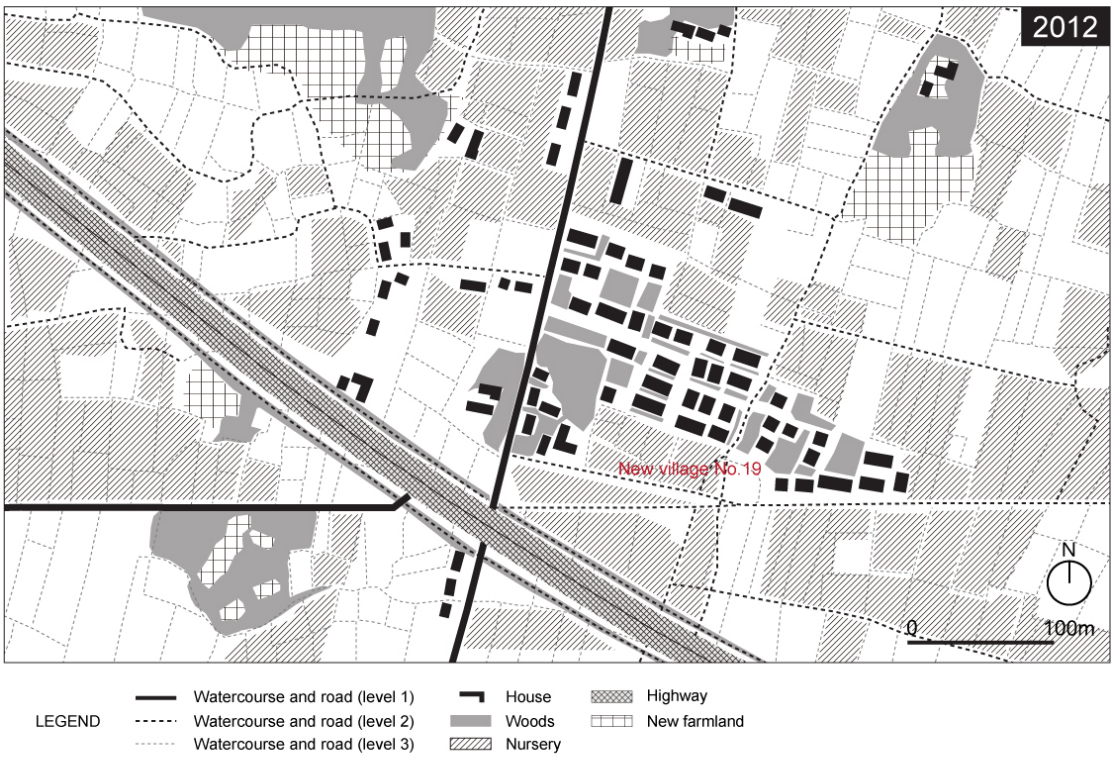




New Village No.	Perimeter(m)	Area(ha)	Household number	Building area(ha)	Building coverage ratio(%)
18	677.52	2.72	153	1.83	67.43

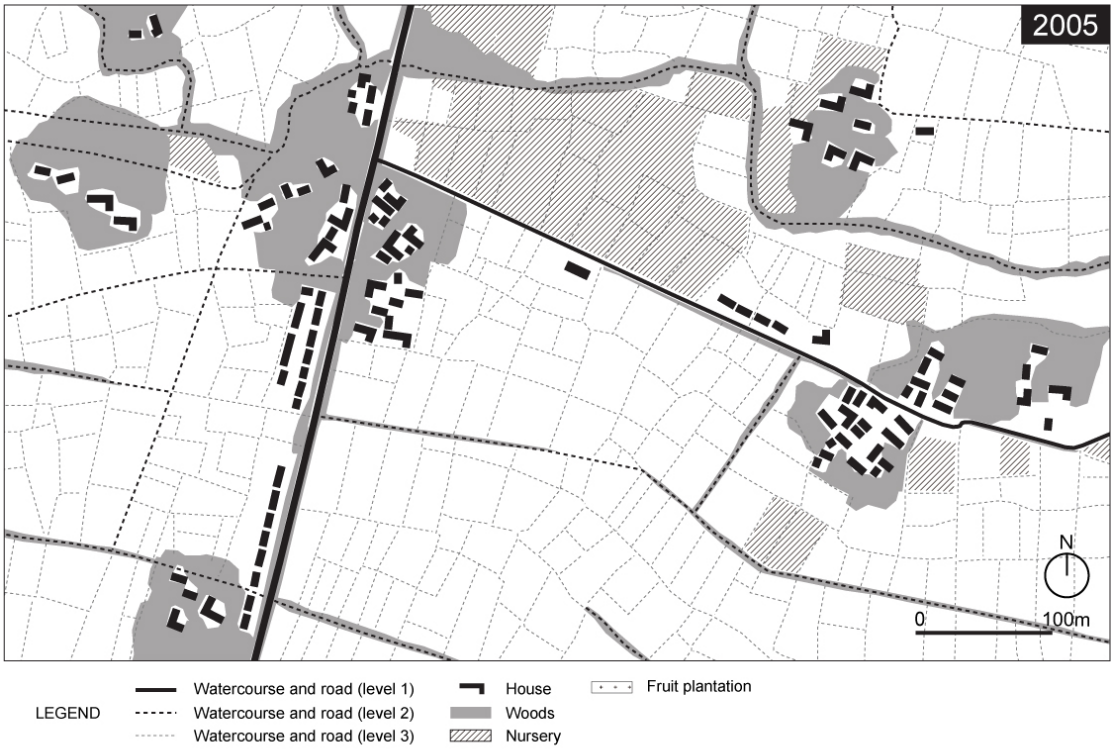
New Village No.18

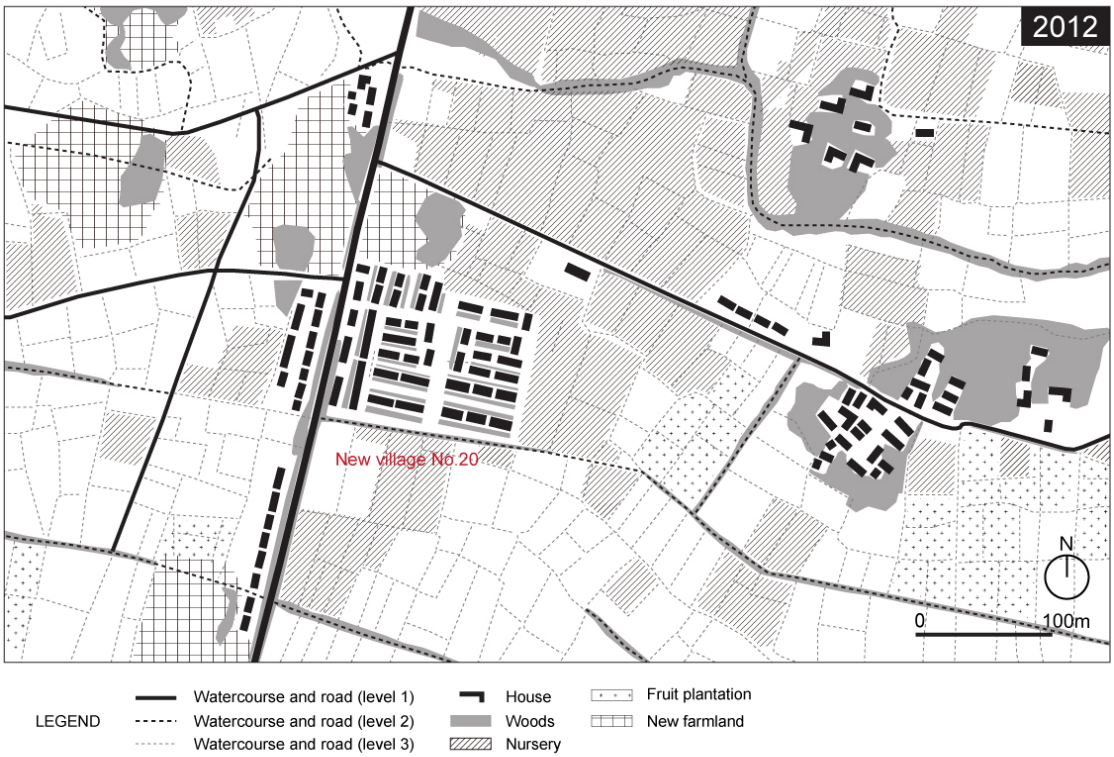




New Village No.	Perimeter(m)	Area(ha)	Household number	Building area(ha)	Building coverage ratio(%)
19	794.06	1.87	78	0.93	49.87

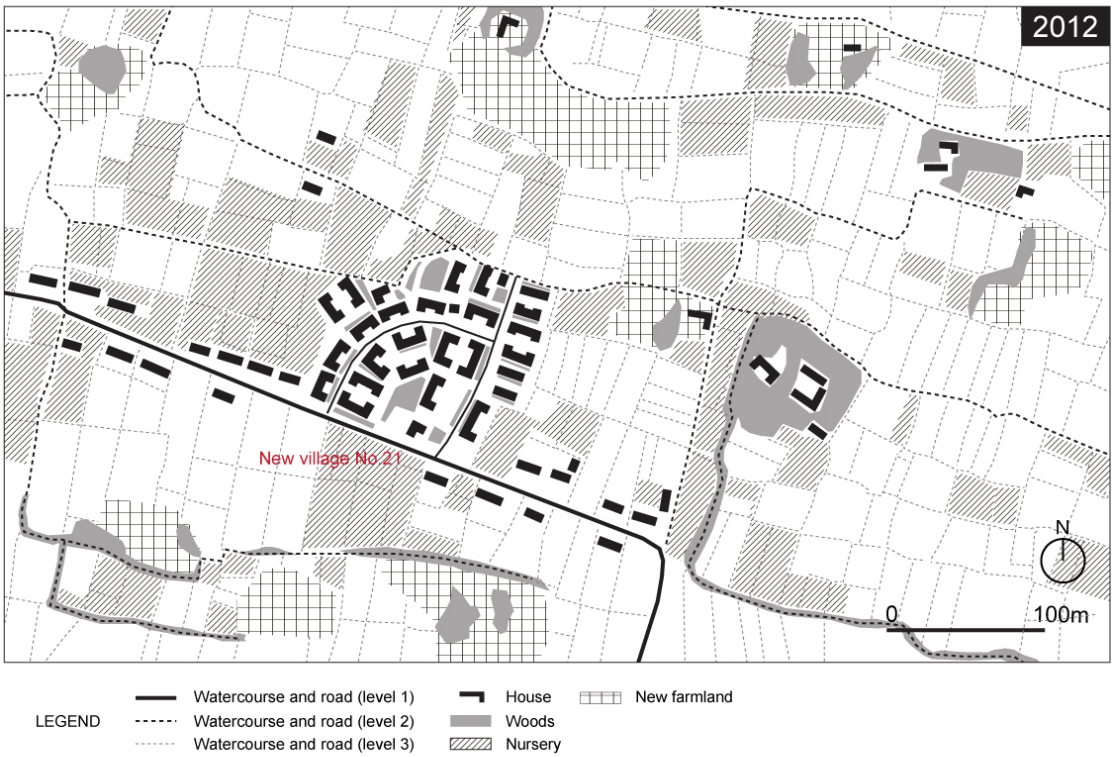
New Village No.19





New Village No.	Perimeter(m)	Area(ha)	Household number	Building area(ha)	Building coverage ratio(%)
20	512.08	1.54	70	0.84	54.51

New Village No.20

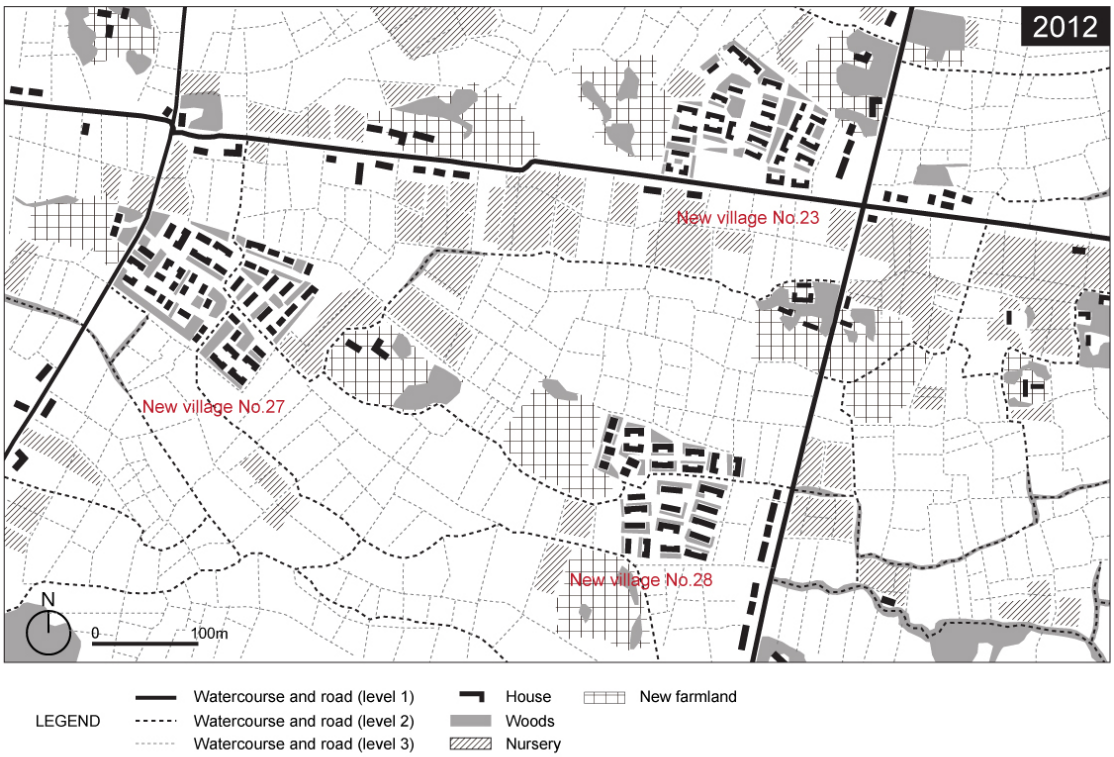


New Village No.	Perimeter(m)	Area(ha)	Household number	Building area(ha)	Building coverage ratio(%)
21	498.01	1.54	84	1.01	65.62

New Village No.21

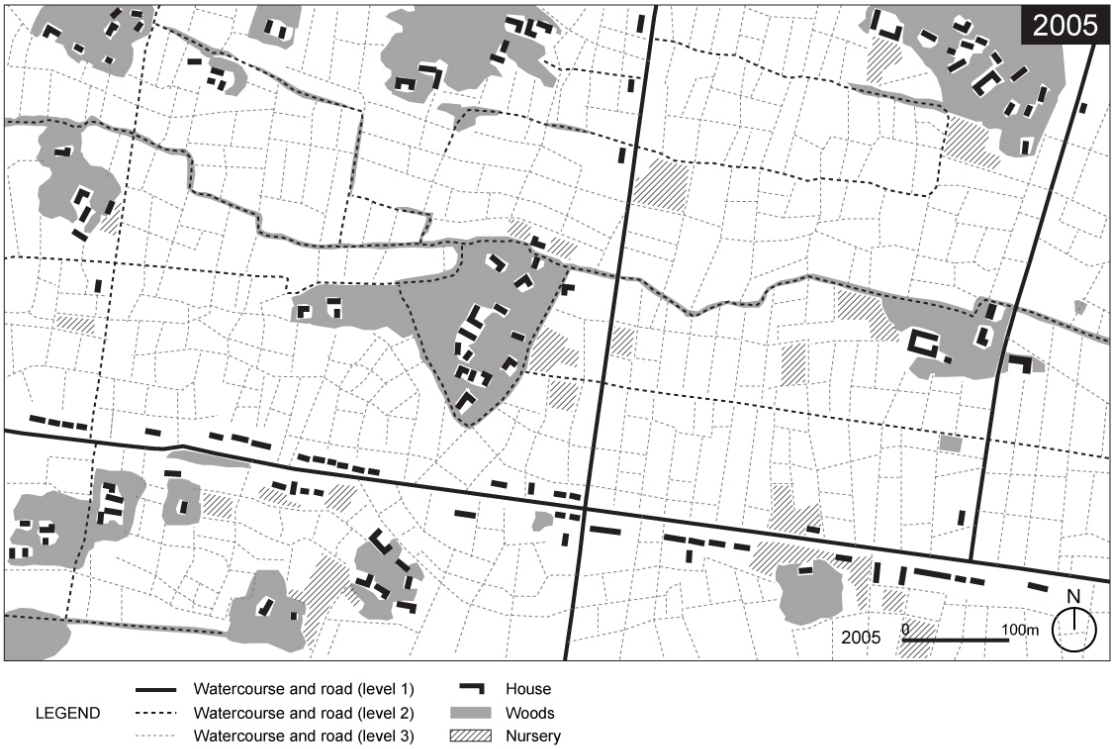
New Village No.	Perimeter(m)	Area(ha)	Household number	Building area(ha)	Building coverage ratio(%)
22	473.96	1.15	50	0.59	51.67

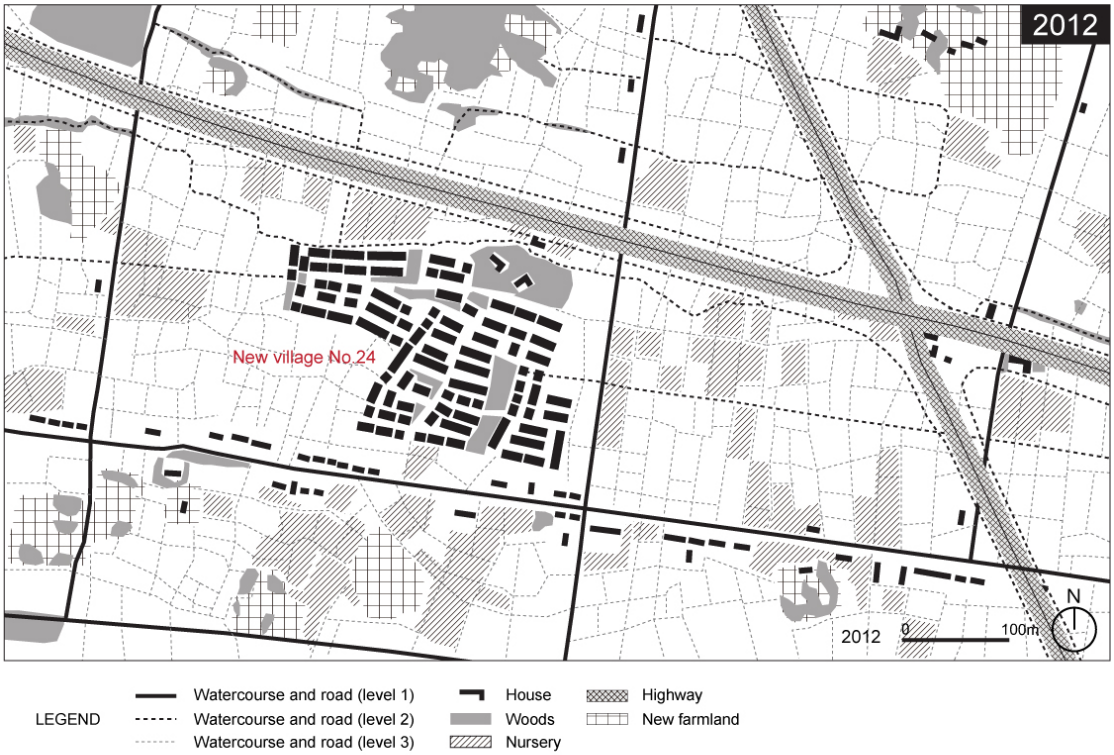
New Village No.22



New Village No.	Perimeter(m)	Area(ha)	Household number	Building area(ha)	Building coverage ratio(%)
23	560.75	1.35	62	0.74	54.89
27	606.83	2.08	102	1.22	58.79
28	502.59	1.43	64	0.77	53.73

New Village No.23, No.27 and No.28



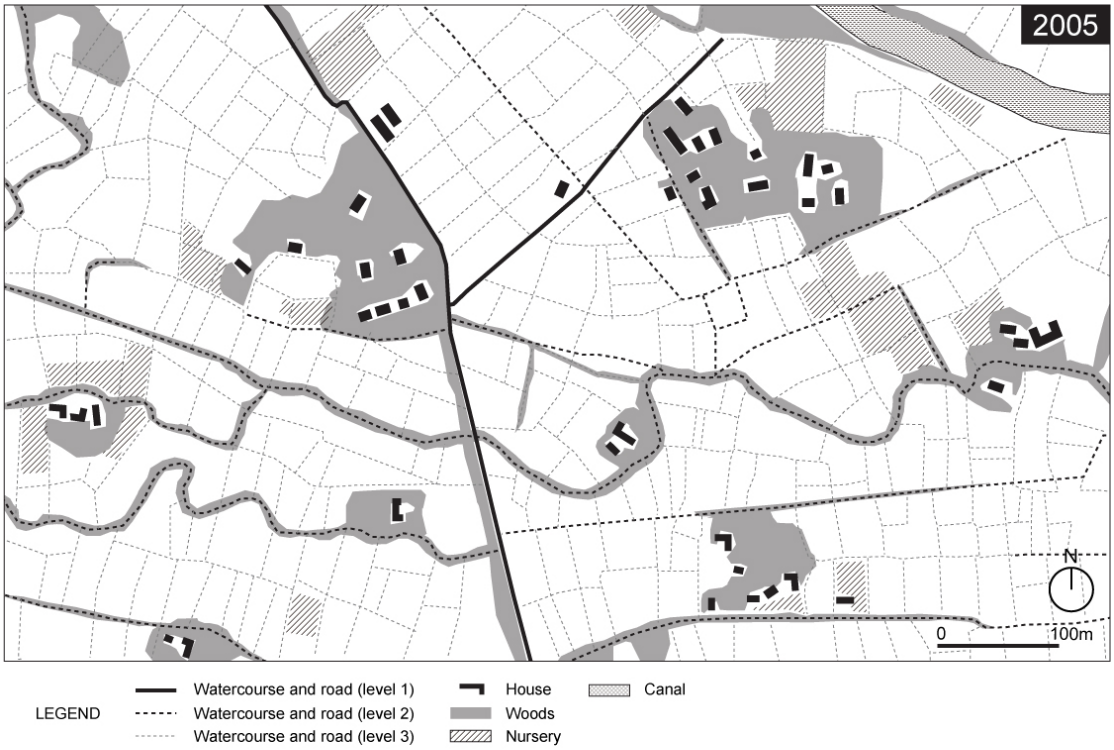


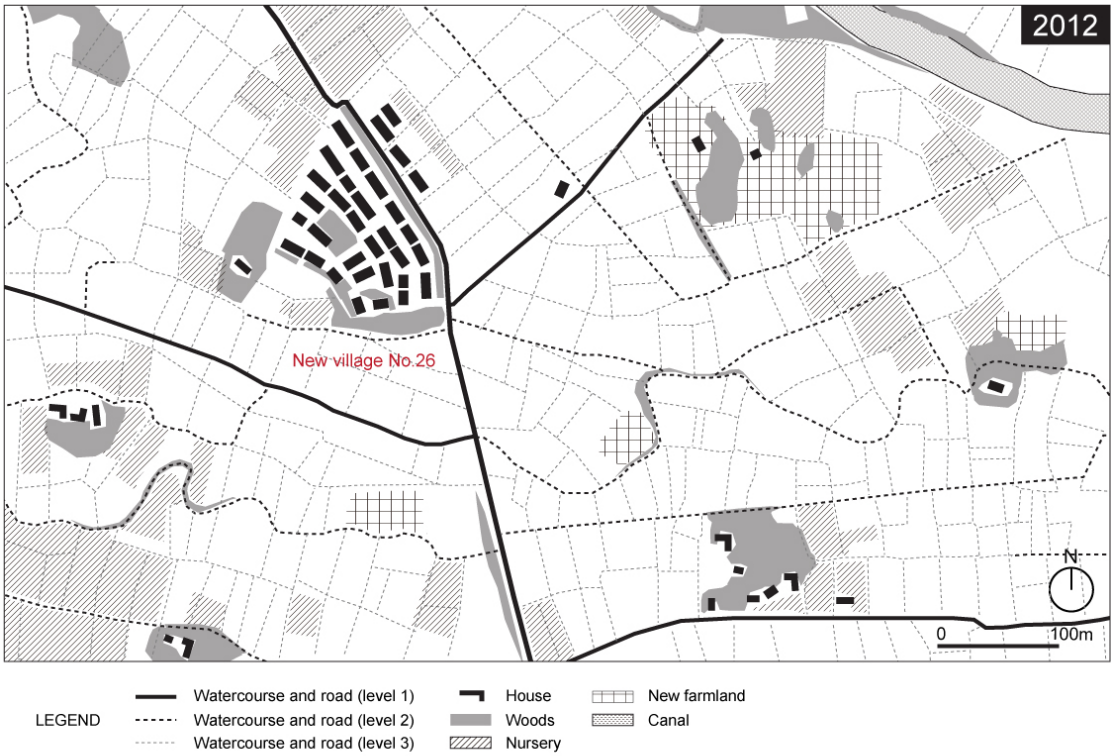
New Village No.	Perimeter(m)	Area(ha)	Household number	Building area(ha)	Building coverage ratio(%)
24	941.12	3.69	171	2.05	55.65

New Village No.24

New Village No.	Perimeter(m)	Area(ha)	Household number	Building area(ha)	Building coverage ratio(%)
25	996.51	5.69	167	3.00	52.74

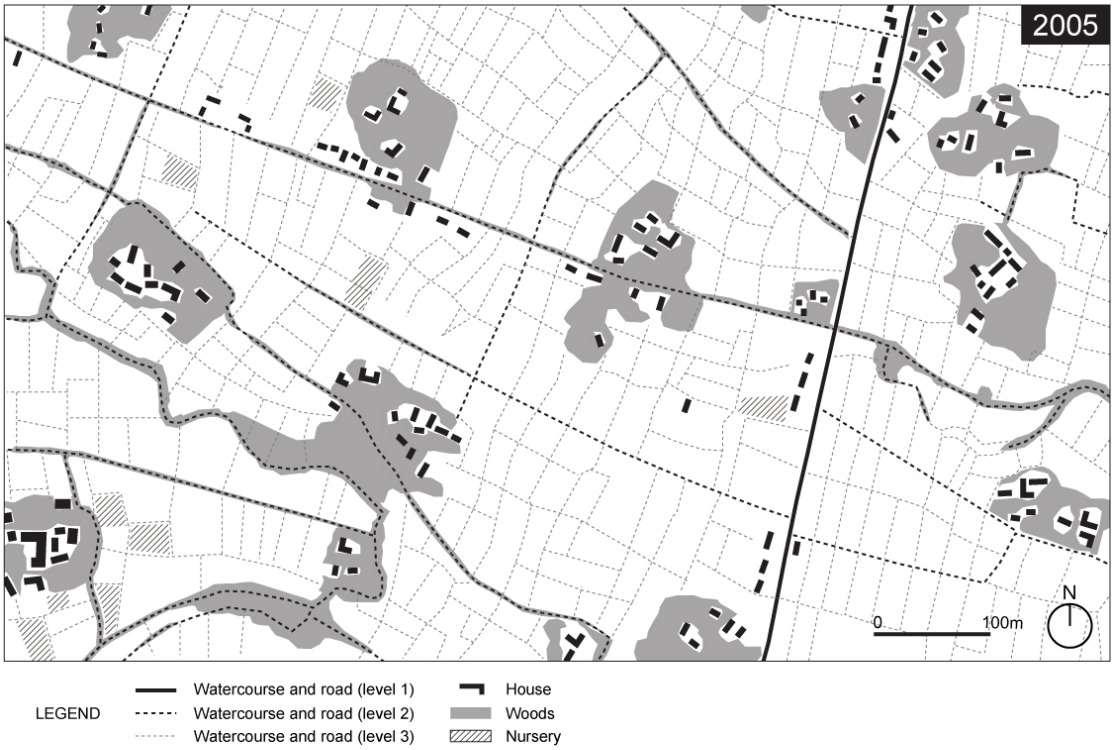
New Village No.25

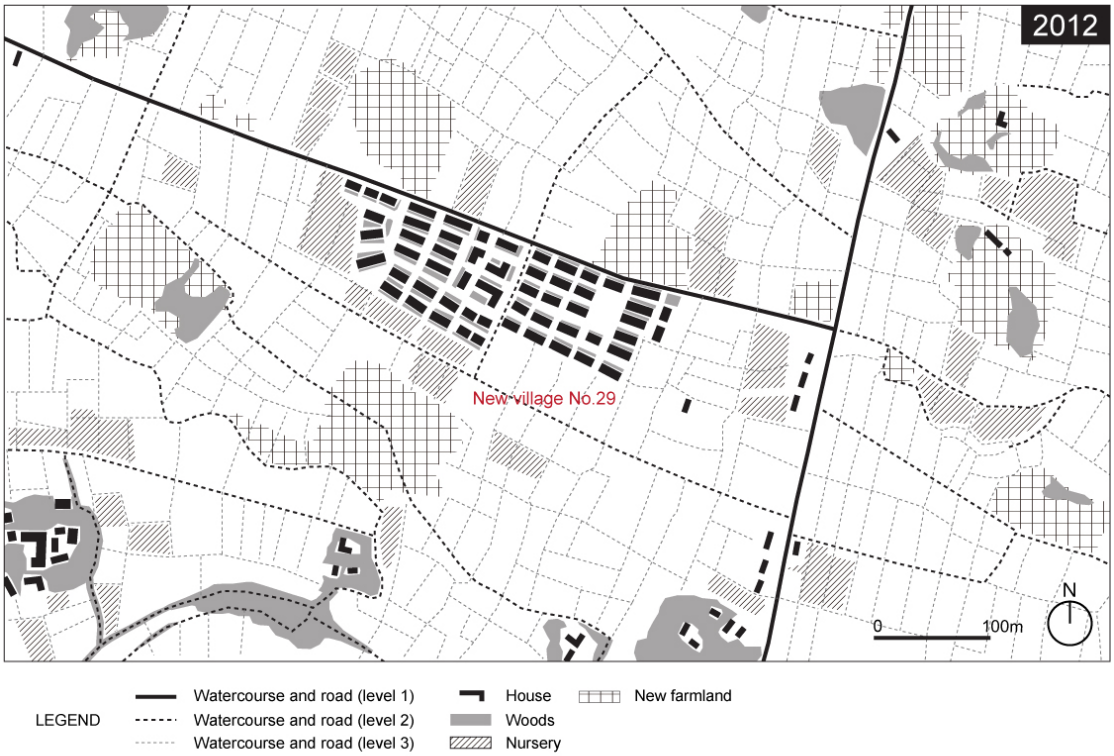




New Village No.	Perimeter(m)	Area(ha)	Household number	Building area(ha)	Building coverage ratio(%)
26	479.65	1.27	53	0.63	49.78

New Village No.26



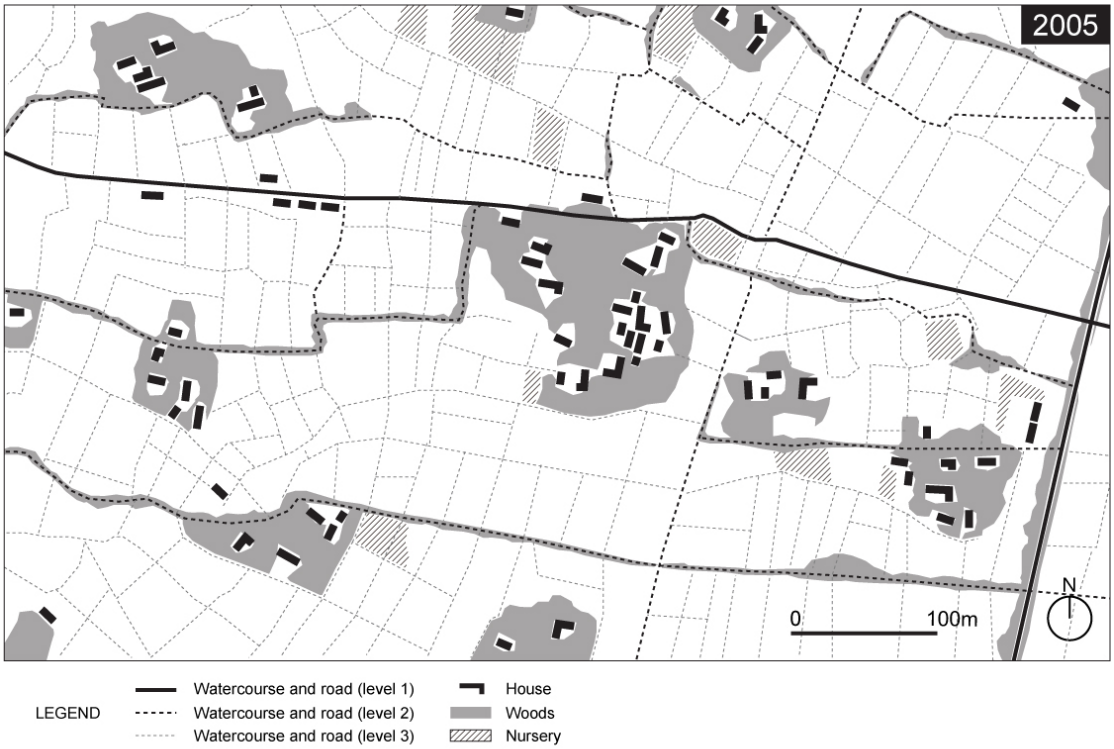


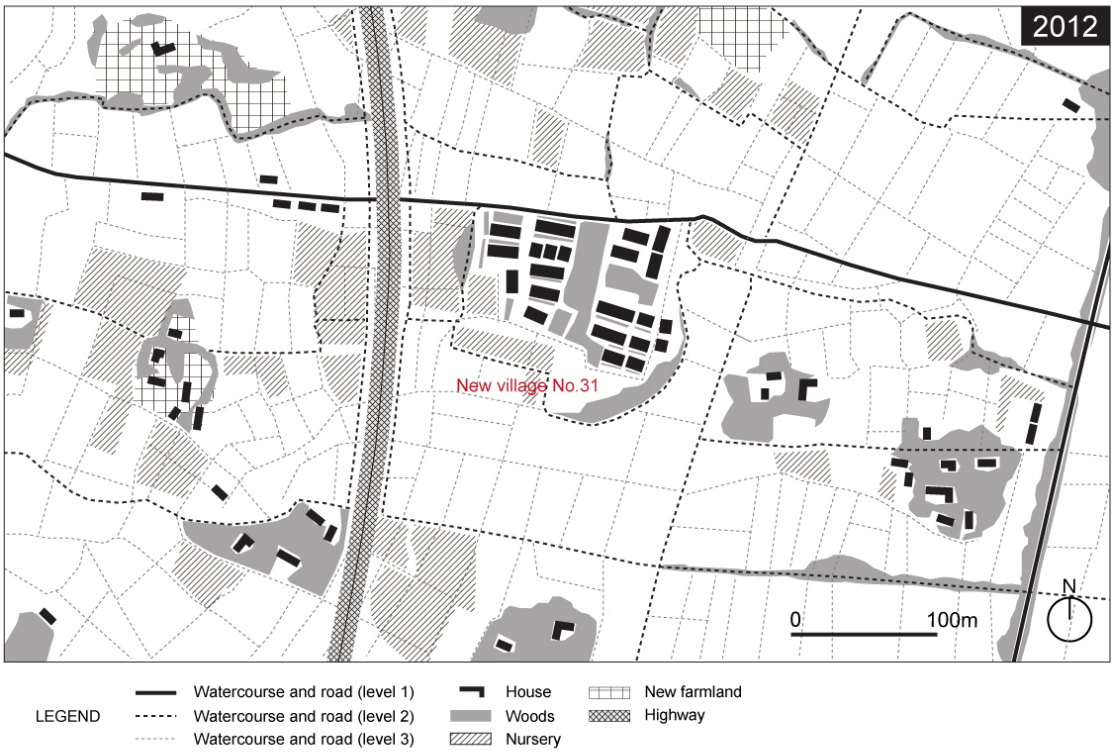
New Village No.	Perimeter(m)	Area(ha)	Household number	Building area(ha)	Building coverage ratio(%)
29	800.98	2.48	134	1.61	64.87

New Village No.29

New Village No.	Perimeter(m)	Area(ha)	Household number	Building area(ha)	Building coverage ratio(%)
30	579.11	1.62	89	1.07	65.83

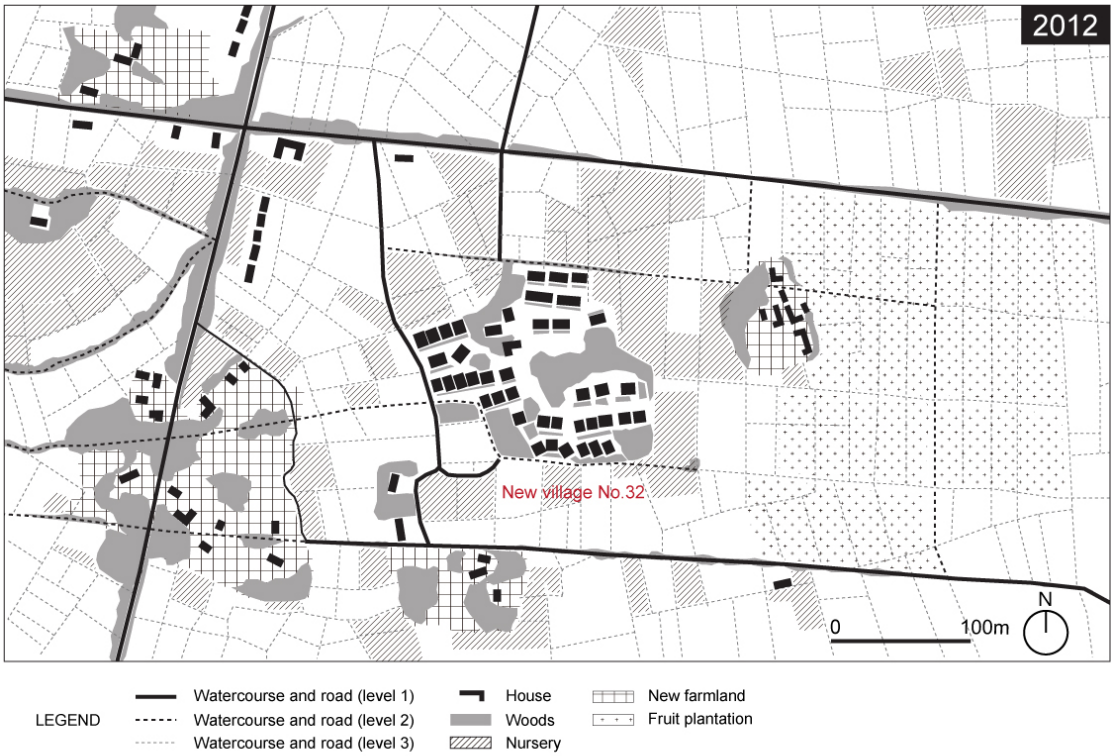
New Village No.30





New Village No.	Perimeter(m)	Area(ha)	Household number	Building area(ha)	Building coverage ratio(%)
31	468.52	1.22	63	0.76	62.16

New Village No.31



New Village No.	Perimeter(m)	Area(ha)	Household number	Building area(ha)	Building coverage ratio(%)
32	568.51	1.79	65	0.78	43.65

New Village No.32

New Village No.	Perimeter(m)	Area(ha)	Household number	Building area(ha)	Building coverage ratio(%)
33	841.98	2.45	100	1.19	48.75
34	635.14	2.42	96	1.16	47.73

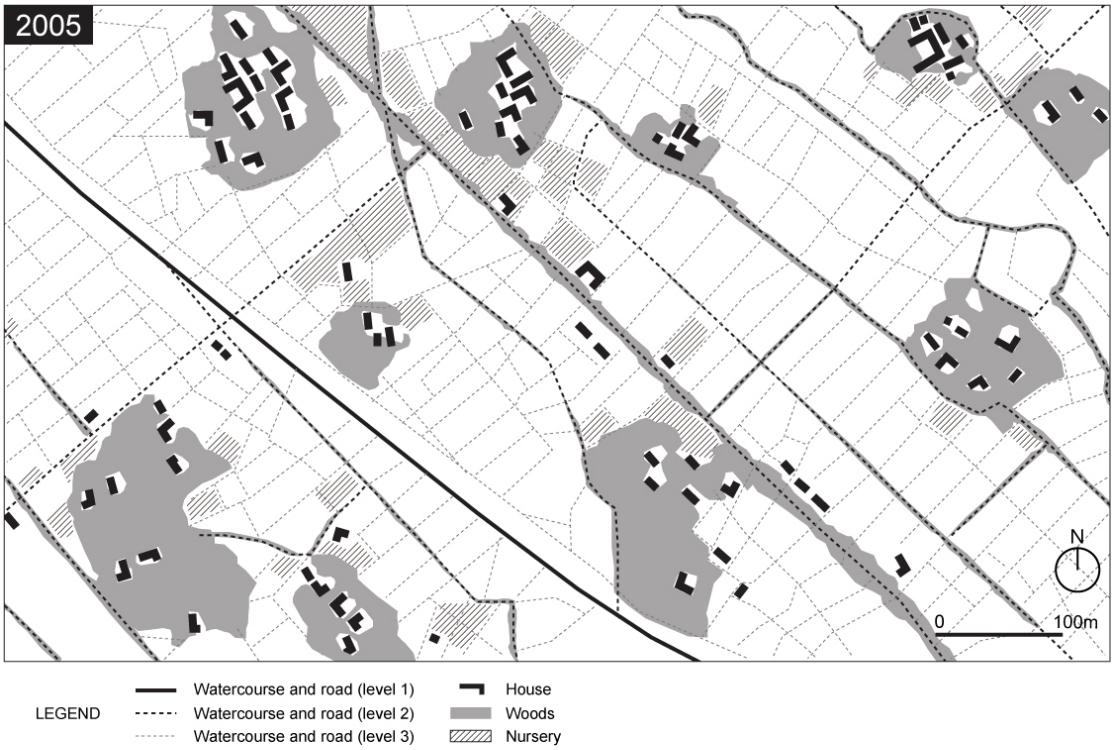
New Village No.33 and No.34

New Village No.	Perimeter(m)	Area(ha)	Household number	Building area(ha)	Building coverage ratio(%)
35	739.67	2.69	123	1.47	54.67
36	965.56	2.84	131	1.57	55.35

New Village No.35 and No.36

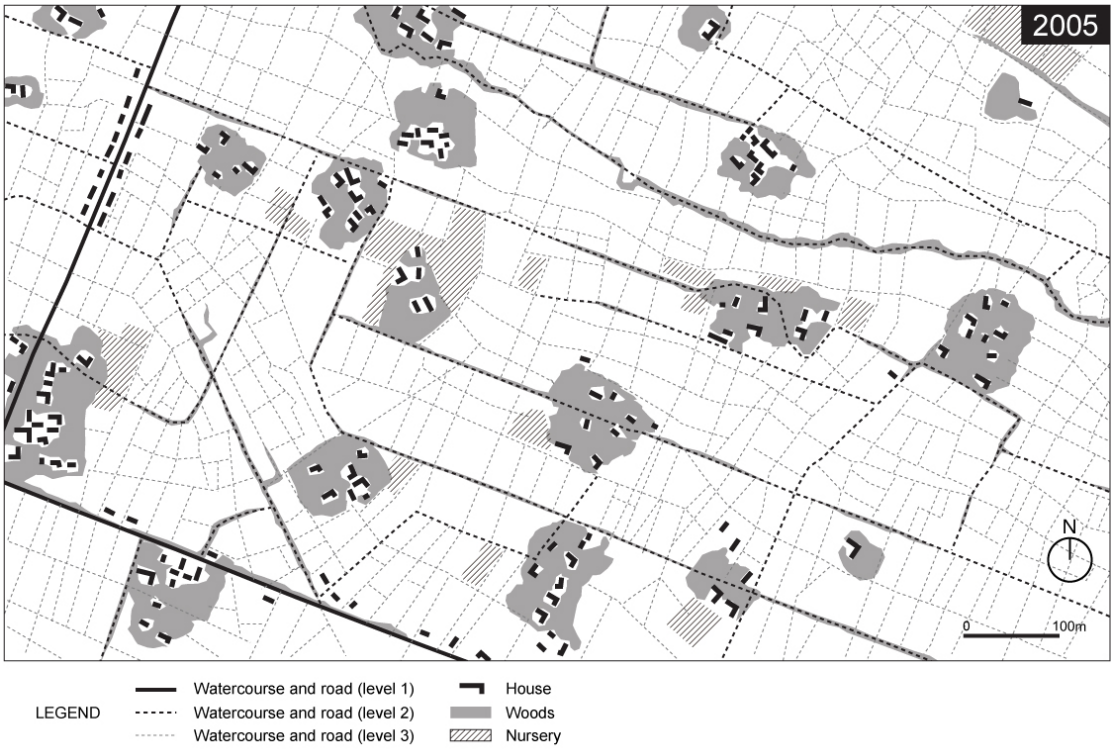
New Village No.	Perimeter(m)	Area(ha)	Household number	Building area(ha)	Building coverage ratio(%)
37	839.88	3.10	150	1.80	57.92

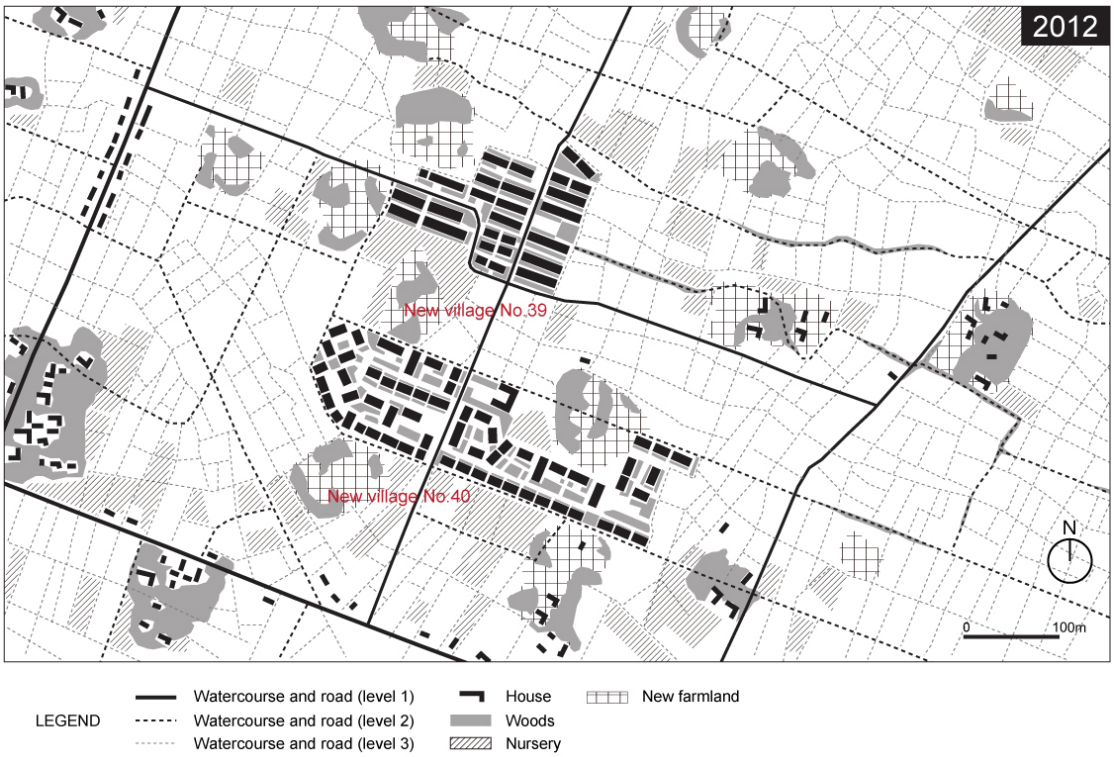
New Village No.37



New Village No.	Perimeter(m)	Area(ha)	Household number	Building area(ha)	Building coverage ratio(%)
38	771.47	2.19	103	1.24	56.69

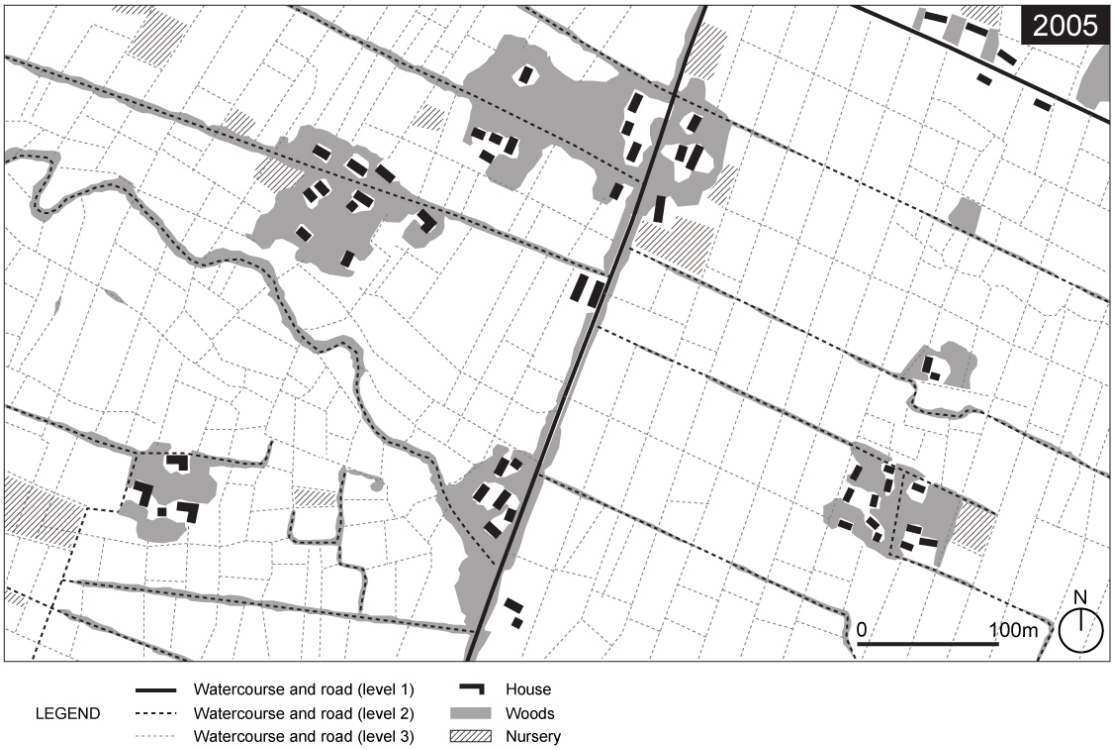
New Village No.38

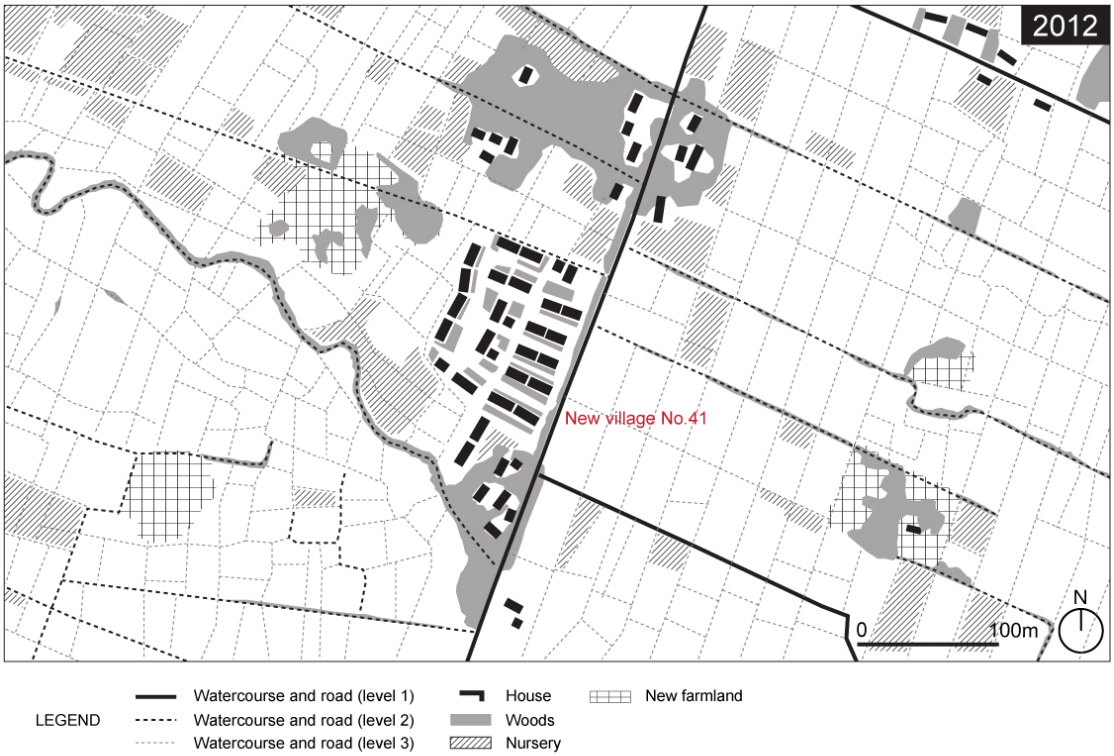




New Village No.	Perimeter(m)	Area(ha)	Household number	Building area(ha)	Building coverage ratio(%)
39	712.15	2.10	87	1.04	49.62
40	1157.46	3.61	169	2.03	56.32

New Village No.39 and No.40



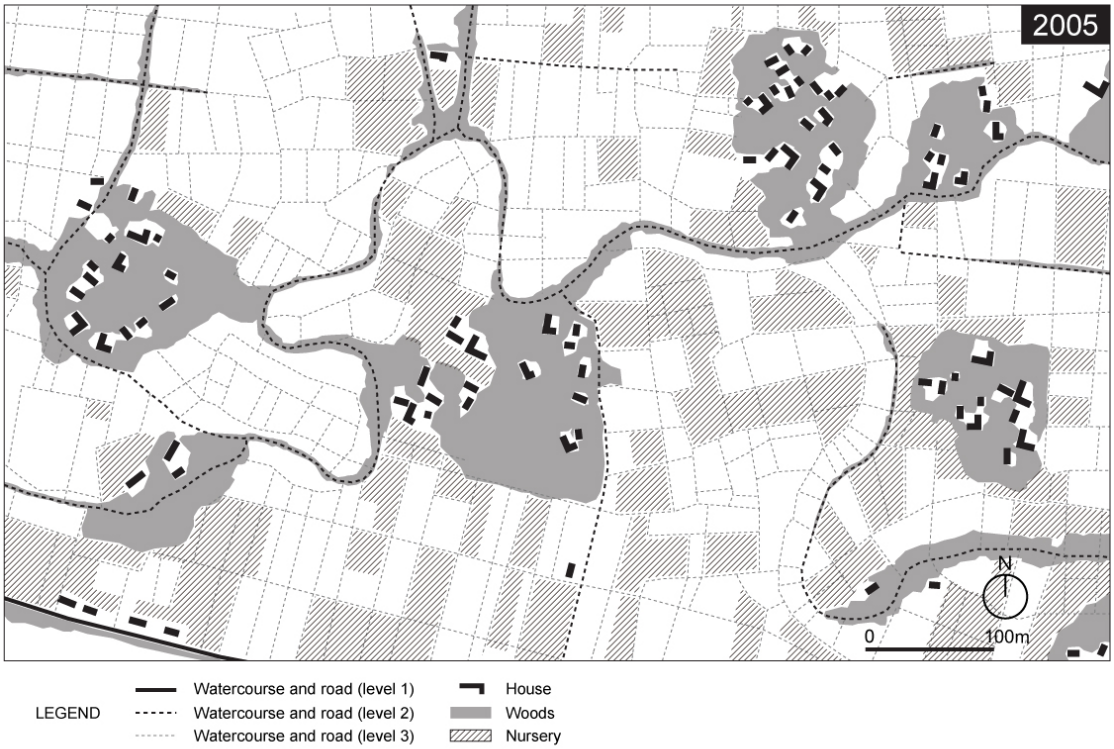


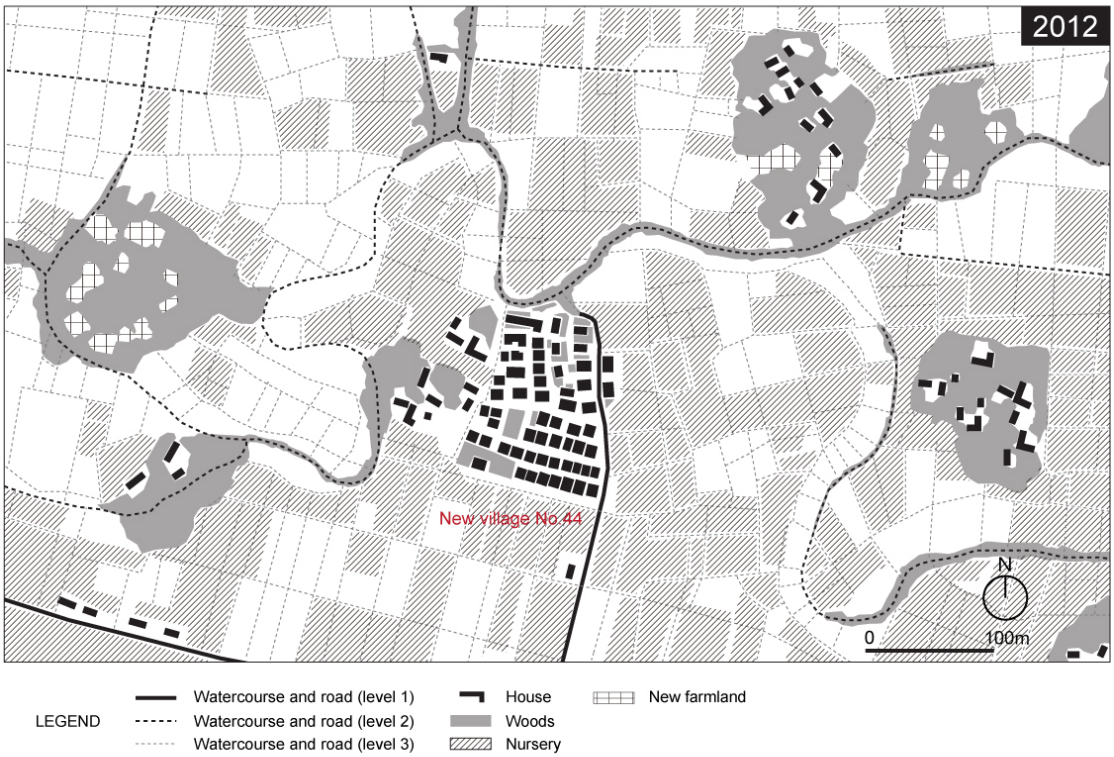
New Village No.	Perimeter(m)	Area(ha)	Household number	Building area(ha)	Building coverage ratio(%)
41	439.23	1.22	52	0.63	51.37

New Village No.41

New Village No.	Perimeter(m)	Area(ha)	Household number	Building area(ha)	Building coverage ratio(%)
42	546.57	1.46	79	0.94	64.56
43	1452.47	5.86	249	2.99	51.06

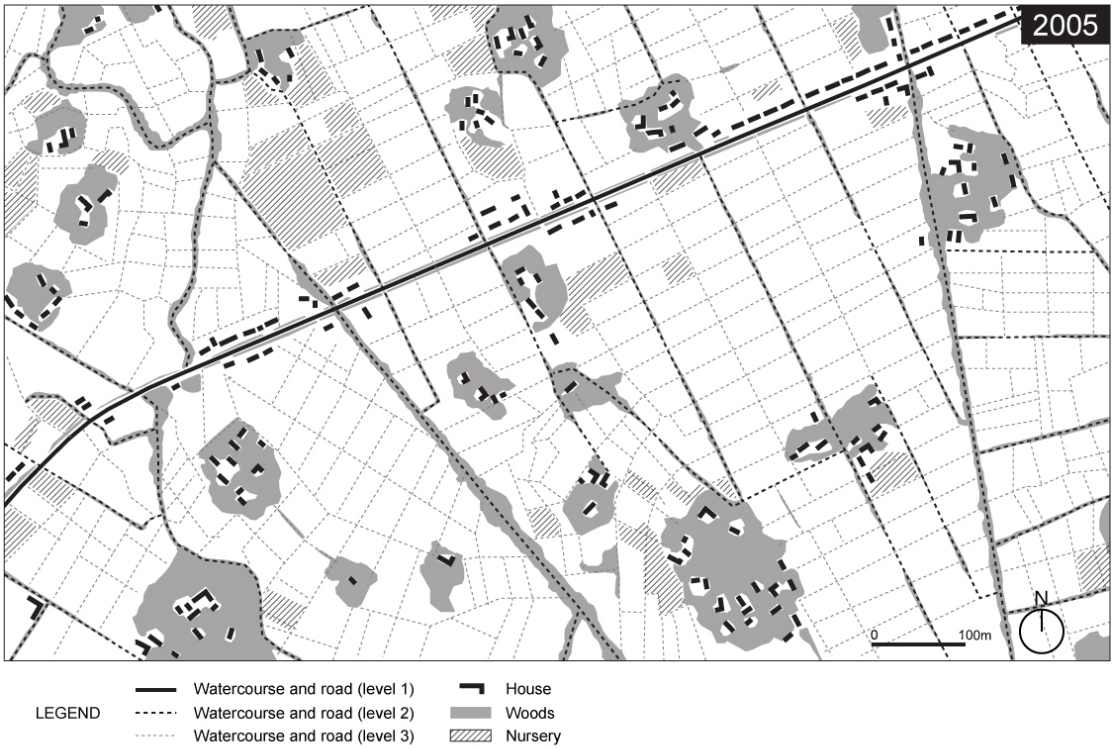
New Village No.42 and No.43

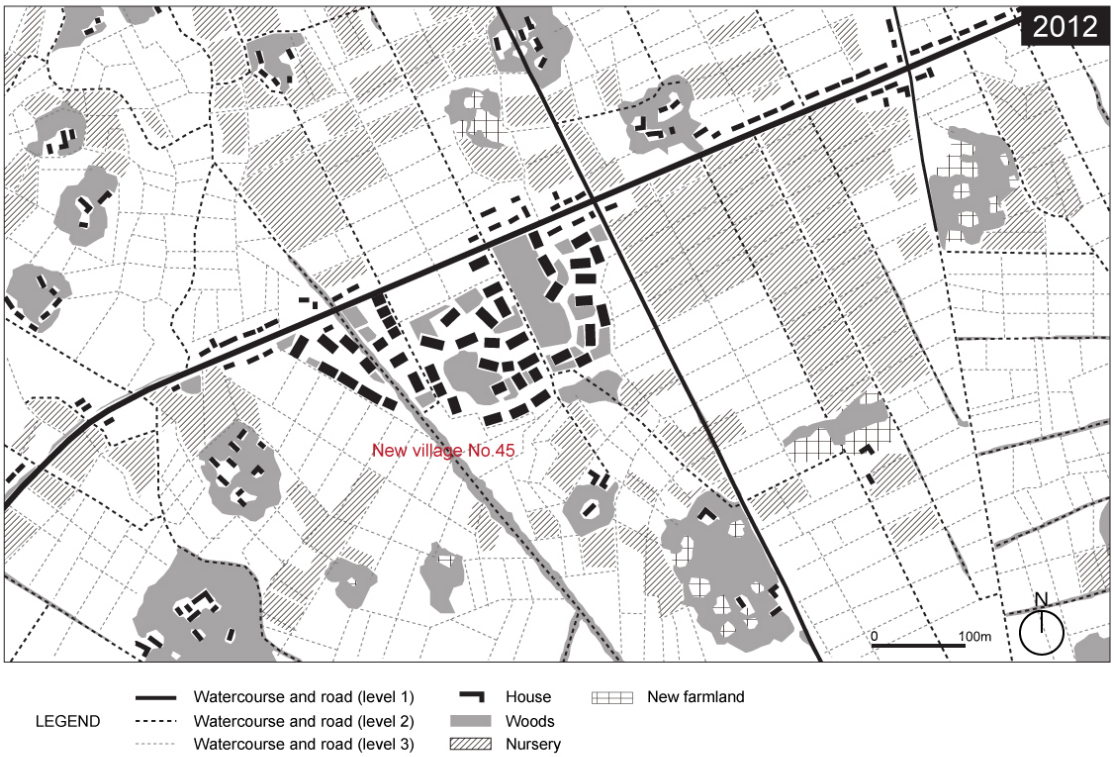




New Village No.	Perimeter(m)	Area(ha)	Household number	Building area(ha)	Building coverage ratio(%)
44	497.74	1.50	82	0.98	65.20

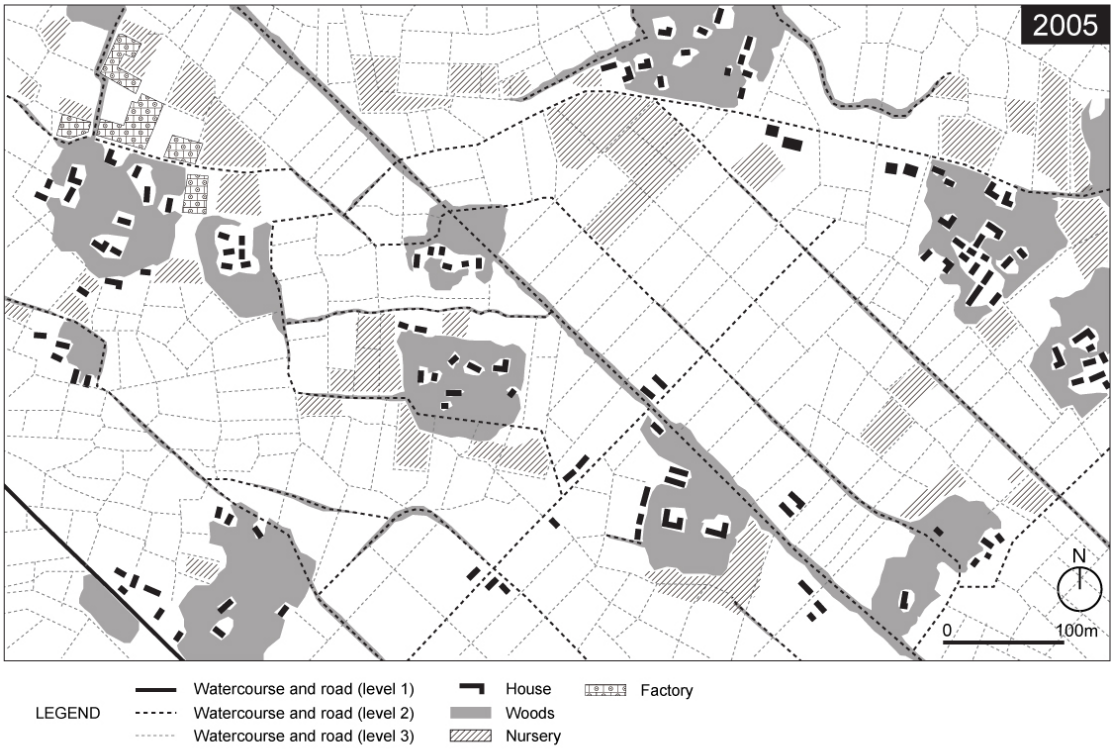
New Village No.44

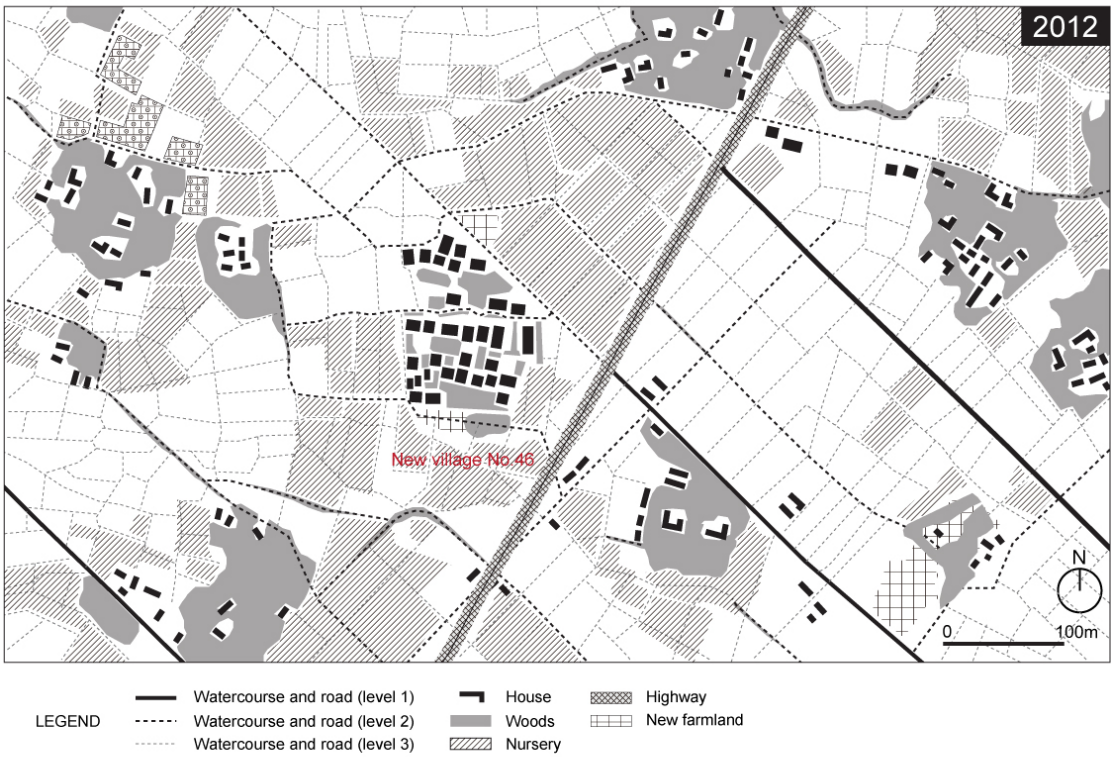




New Village No.	Perimeter(m)	Area(ha)	Household number	Building area(ha)	Building coverage ratio(%)
45	1269.97	3.89	110	1.76	45.21

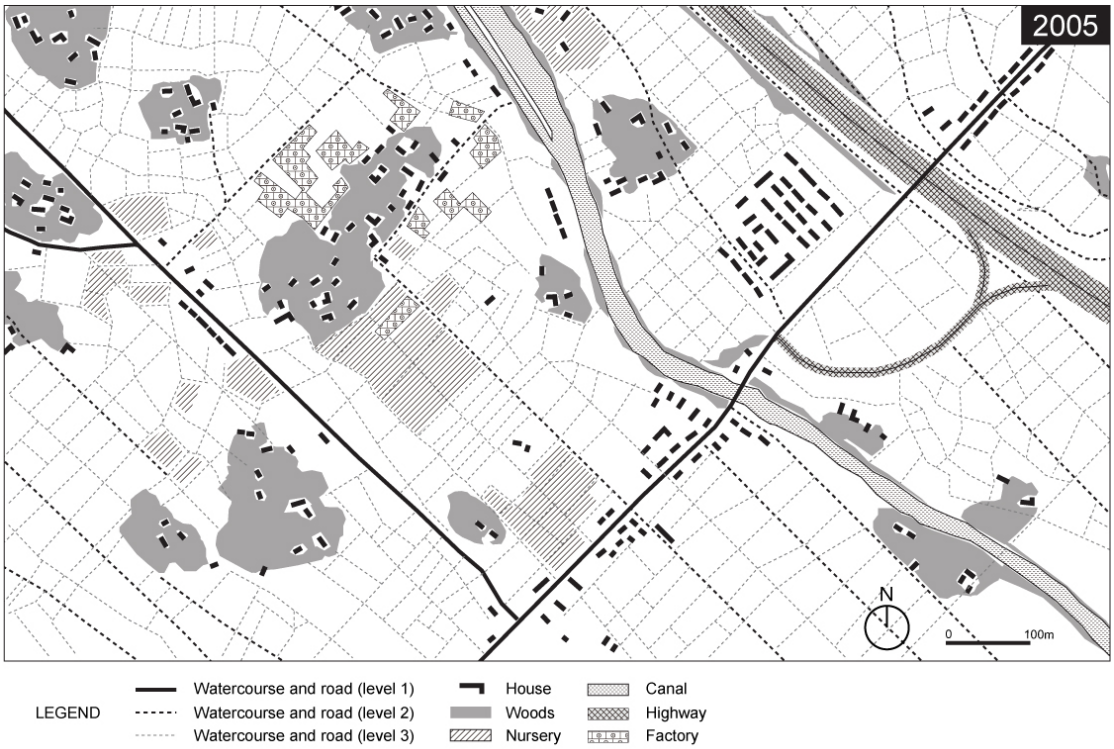
New Village No.45

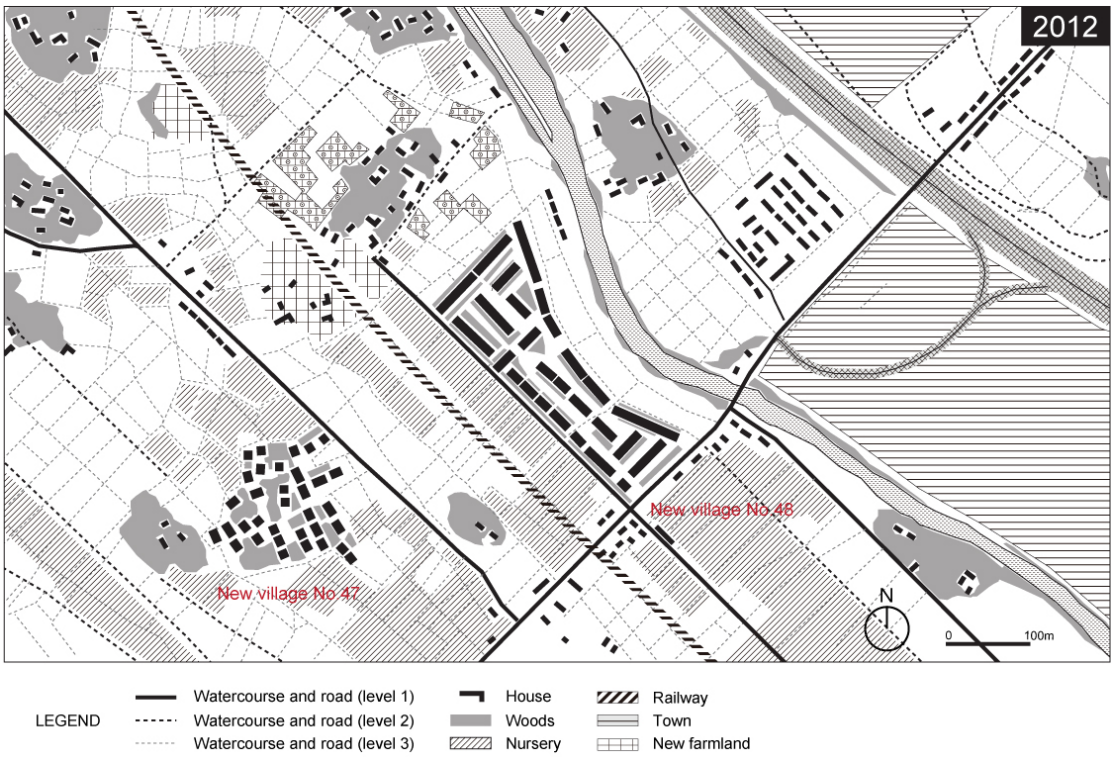




New Village No.	Perimeter(m)	Area(ha)	Household number	Building area(ha)	Building coverage ratio(%)
46	474.93	1.42	58	0.69	48.93

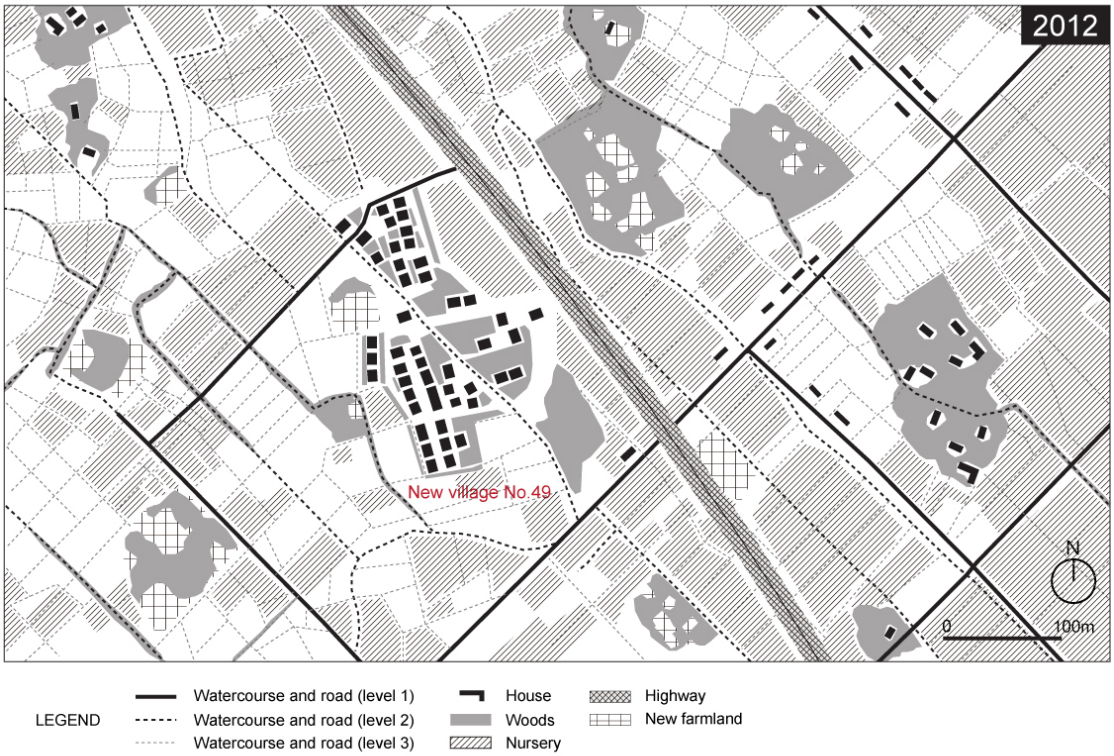
New Village No.46





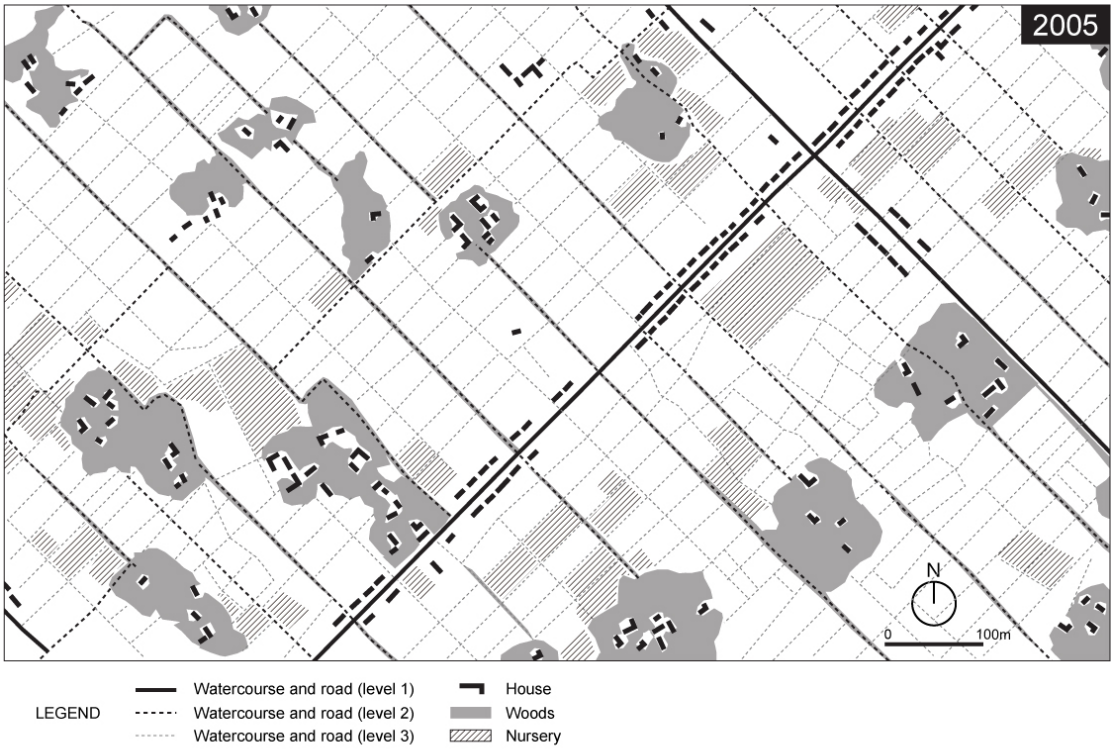
New Village No.	Perimeter(m)	Area(ha)	Household number	Building area(ha)	Building coverage ratio(%)
47	709.40	2.04	81	0.97	47.62
48	1026.70	4.31	192	2.31	53.54

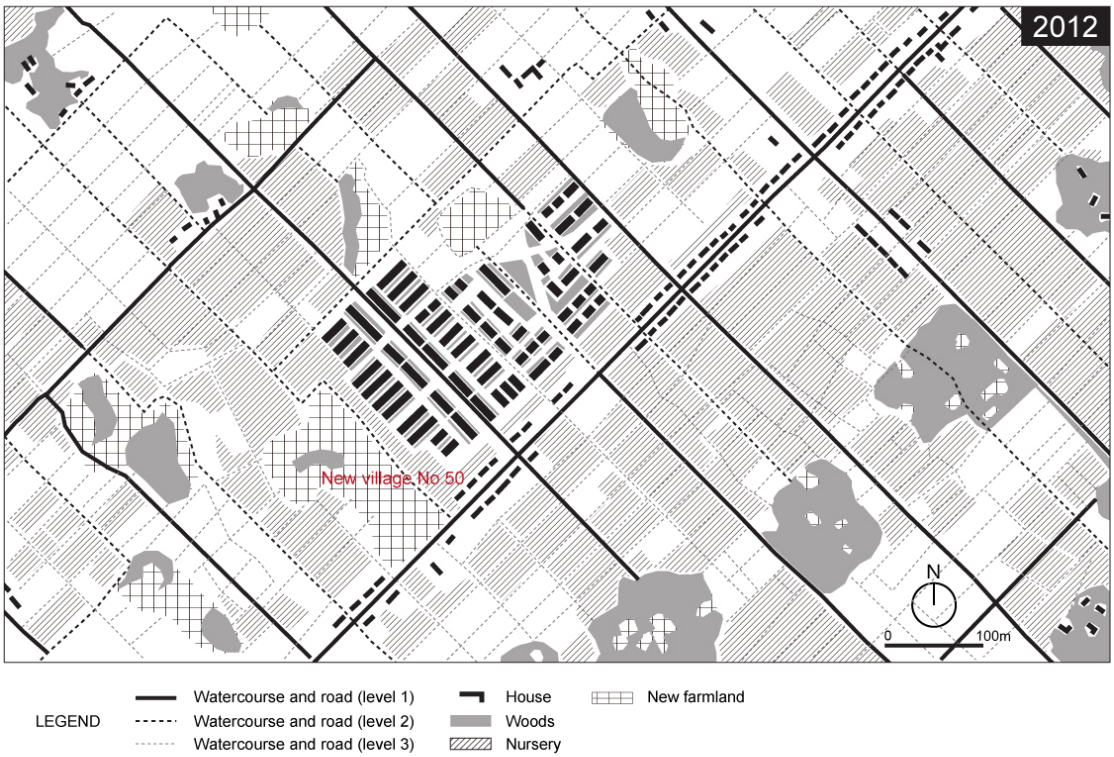
New Village No.47 and No.48



New Village No.	Perimeter(m)	Area(ha)	Household number	Building area(ha)	Building coverage ratio(%)
49	788.20	2.38	111	1.33	55.89

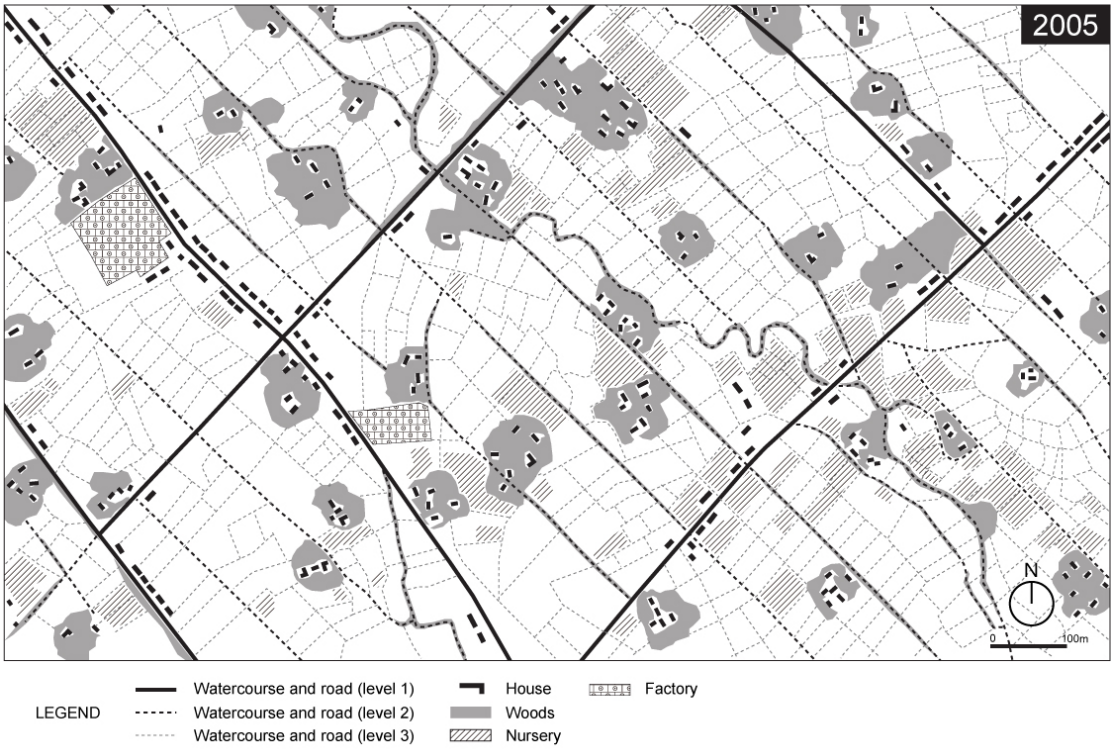
New Village No.49





New Village No.	Perimeter(m)	Area(ha)	Household number	Building area(ha)	Building coverage ratio(%)
50	1002.35	4.66	225	2.70	57.92

New Village No.50



New Village No.	Perimeter(m)	Area(ha)	Household number	Building area(ha)	Building coverage ratio(%)
51	1077.89	6.75	208	2.49	36.89
52	1830.90	16.71	497	5.97	35.71

New Village No.51 and No.52

General Conditions of Linpans in Dujiangyan City After the Sichuan Earthquake—A Survey by Tokyo University and GCOE

This questionnaire will serve only to the academic research led by the GCOE of Tokyo University on the conditions of Linpans in Dujiangyan City after Sichuan Earthquake. No other purposes for using this survey will be accepted. We sincerely appreciate your assistance and cooperation during this survey.

Please provide your basic information: Name__ Age_ Gender_ Address
(Please specify the aforesaid address: __Village __Production Brigade __Linpan)
Date of filling this survey: ____Year __Month __Day

1. Since when did your family start living here?
   1） In my grandparents' generation 2）In my parents' generation 3） After my marriage

2. How many people are living with you now?
   1） 3 persons 2） 4 persons 3） 6 persons 4） 8 persons 5） More than 10 persons

3. How many generations of family members are there in your house?
   1）One generation 2）Two generations 3）Three generations
   4）Four generations 5）Five generations

4. Which of the following best describe your occupation?
   1）Agrarian production 2）Working as labors in the cities 3）Self business (farm tourism)

5. How is your monthly income?
   1）Around 500 RMB 2）Around 1000 RMB 3）Around 2000 RMB 4）Around 3000 RMB 5）More than 3000 RMB

6. If possible, in which of the following cities would you or your family members want to work?
   1） Chengdu 2） Dujiangyan 3） Other big cities
   How much income can be obtained if working in the aforesaid city?
   1）Around 500 RMB 2）Around 1000 RMB 3）Around 2000 RMB
   4）Around 3000 RMB 5）More than 3000 RMB

7. What is the size of your current residence?
   1）Under 0.8 acres 2）1-1.5 acres 3）1.5-2 acres 4）More than 2 acres

8. What is the size of your private plot? ____ Acres

9. What is the size of your farmland? ____ Acres

10. Which of the following best describe the function of your Linpan? Please put a check on the following items that describe your condition properly. (You can choose more than one)

1）Vegetable planting 2）Fruit planting 3）Herb planting 4）Flower planting
5）Herbal medicine planting 6）Pot plant planting
7）Others _____

11. What crops do you plant?

In spring	In summer	In autumn	In winter

12.What is the function of the trees in your Linpan? Please put a check on the following items that describe your condition properly. (You can choose more than one)

1）As building materials or for the furniture production 2）As fuel 3）For planting mushrooms 4）As fertilizers 5）For eating (medicine) 6）Planting seedlings (such as Ginkgo, flower trees or pot plants)

13. What kind of animal do you have in your Linpan? (You can choose more than one)
1）Fish 2）Chickens 3）Ducks 4）Pigs 5）Sheep 6）Cows 7）Bees
8）Others _____

14. Which of the following items exist in your residence? (You can choose more than one)
1）Residential house 2）Rooms for piling woods or other materials
2）Courtyard 4) Well 5) House for livestock 6) Others _____

15. Which of the following items do you cherish most in the Linpan?
1) The trees surrounding the house 2) The cemetery of the ancestors
3) Economic forests 4) Others _____

16. How is the damage in your house when the earthquake struck?
1) Collapse 2) Irreparable damage 3) Repairable damage

17. What approach did you use to repair the house after the earthquake?
1).Planned construction by the government 2). Self-construction at the original site 3) Reinforcement repair

18. What kind of work do you plan to do to make living in the future?
1) Maintain current agrarian production works
2) Incorporating new business to increase income (such as farm tourism) while continuing agrarian production.
3) Do agrarian works and go to cities to work at the same time.
4) Leave agrarian production and do other works.

19. What is your opinion, ideas and comments concerning the New Village Construction Movement? (Please elaborate in detail.)
_____

20.(question for farmers living in New Village)
Do you think your life quality has been improved after you moved into New Village?
1) Yes, life quality has been improved a lot
2) No, the improvement is not enough
3) I have other opinions

21.(question for farmers living in New Village)
Which do you think is the biggest problem of New Village?
1) Compared to former Linpan, the living space has been largely squeezed
2) Cost of living increased because of all kinds of fees happened
3) No enough space to plant vegetables or raise livestock inside New Village
4) I have other opinions

22.(question for farmers living in New Village)
How many persons in your family are the migrant workers?
1) No one
2) 1 person
3) More than 1 person