

Problems and Countermeasures of Dujiangyan Agricultural Area Protection during the Rapid Urbanization in Chengdu

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1. The Devourment of Dujiangyan Essential Agricultural Area during the Rapid Urbanization in Chengdu

Known as the Land of Abundance and one of the basic economic regions of China since Qin Dynasty, Dujiangyan irrigation area of Chengdu Plain, with the developed artificial basin system gestating the city and Lin Pan, is one of the important essential agricultural areas and a typical example of traditional human settlement practice of ecological civilization.

Chengdu Plain is in tempestuous change contemporarily among the rapid urbanization process. The form of traditional ecological culture is seriously separated in the current era. The process of urbanization expanding on the land formed by thousands of years of hard work is full of conflicts, challenges and even unpredictable risks in the future. Over nearly 30 years, Chengdu Plain has gradually formed a city-centered development model, particularly with Chengdu as the center, enabling the existing traditional human habitat pattern to deteriorate in a gradual manner. In this process, the essential farming area has been swallowed by the fast-growing urban construction land, which shows obvious confrontation between urban development and vast natural areas.

Chengdu's urban area covers an area of 483.35 km² as of 2011, but 95 km² 25 years ago (1986), exhibiting an increase of 388.35 km². However, by 2011, the total built-up area of the six cities of Chengdu, Deyang, Mianyang, Meishan, Leshan and Ya'an was 769.3 km², but 147 km² 25 years ago (2011), up by 622.3 km², with the growth of Chengdu accounting for 62.4%. The data indicate the overall rapid urbanization in Chengdu Plain, and also reveals the obvious single-center growth state of Chengdu, central city in Chengdu Plain, in nearly 25 years' urbanization.

By comparing change of cultivated land in 2011 with that in 1991, the overall arable land in Sichuan Province decreases by 6,489 km², and that in Chengdu is down by 1,378 km², accounting for 21.2% of the whole province, while the total arable land of Chengdu, Deyang, Mianyang, Meishan, Leshan and Ya'an has a reduction of 3,603 km², occupying 55.6% of the whole province. From the statistical data changing curve, after implementing strict policy of cultivated land protection in 2004, the number of cultivated land in Sichuan remained unchanged and a slight increase year by year, however, contains the total range of arable land of six cities in Chengdu Plain being still in the trend of obvious declination. From 2004 to 2011, the cultivated land of six cities reduced by 483.3 km², wherein Chengdu decreased by 320.2 km², accounting for 66.3%.¹

The change of Chengdu Plain built-up area and farm land indicates that the current urbanization has tremendous destruction of agricultural land, and this tendency continues. In the next 20 to 30 years, in accordance with the master plan of the existing counties in the Chengdu Plain of construction land use in indicator development, greater pressure will be exerted on the plain agriculture area. As to Tianfu New Area in the south of Chengdu under construction, the land planned for use has more than 1500 km². By 2020, the building land is going to rise by 550 km², and increase to 650 km² by 2030,² linking up with Chengdu into a single stretch with the growth equivalent to an additional city of Chengdu.

For Dujiangyan irrigation area, 17 counties, that is, Guan, Pi, Chongqing, Shuangliu, Chongning, Peng, Xindu, Xinfan, Jintang, Wenjiang, Huayang, Chengdu, Xinjin, Guanghan, Qingshen, Pengshan and Meishan were irrigated before the foundation of the PRC. The

water conservancy management and development of Dujiangyan irrigation area gradually became modernized and specialized after the establishment of the PRC. The irrigation area now continues to expand in hilly countryside. At present, it has an area of 23,200 km², covering the total arable land nearly 17,632,500 km². The beneficial scope includes Chengdu, Deyang, Mianyang, Leshan, Meishan, Suining and Ziyang, totally 7 cities and 37 counties (towns and districts).³ However, the expanded regions are the areas where natural conditions are relatively weak, while the traditional core irrigation area, especially Chengdu, was put into the reality and risk of being swallowed.

The writer combines the present situation of urbanization in the Chengdu Plain with the master plan of each city of the plain in 2020 together. From the view of configuration, Chengdu displays the shape of increased concentric circle and then gradually increased radial pattern, linking up with Pi, Chongzhou and Wenjiang. Tianfu New Area expands southwards, adjacent to part of Xinjin and Meishan. The essential irrigation area of Dujiangyan shows a clear sense of oppression and the tendency of fragmentation.

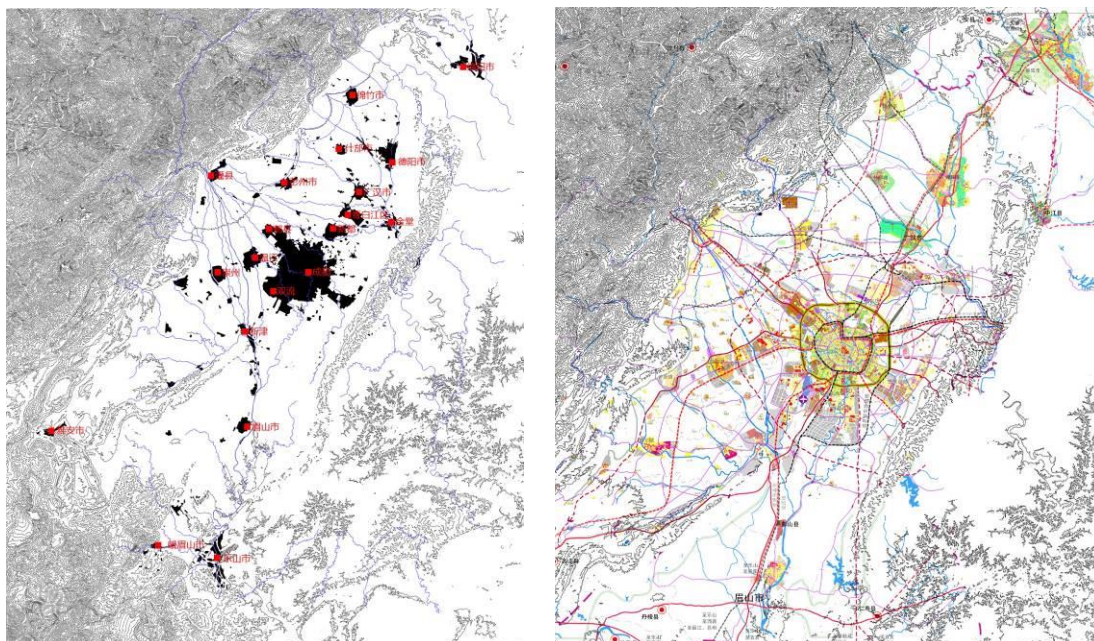


Figure 1: present urbanization pattern (left) and planning in the future (right)

2. Current Agricultural Region Protection Policy and Deep Risks

The open space of the Chengdu Plain has a variety of protection measures during the rapid urbanization in Chengdu. To limit the pernicious urban expansion and promote the protections of agricultural areas, Chengdu has launched and implemented a number of relevant policies, mainly including: (1) answering the call of the country to establish basic farmland protection system; (2) launching creative arable land protection fund in 2008 (has already issued farmland protection fund RMB 1.19 billion to the benefit of 1.14 million households⁴) (3) delineating "198 zones" in the plan, and creating new mode of urban open space in external protection and development; (4) developing *Planning of Lin Pan Protection in Western Sichuan* in the unit of district and county in 2007.

The implementation of the policies has played an active role to protect the open region in the periphery of the city. But we still need a deeper understanding of the hidden deep contradictions and ecological risks behind the implementation of the policies, and judgment on these risks will directly determine the future improvement, promotion of the effective protection of ecological resources. The deep-rooted risks can be seen from several aspects as follows:

2.1 Rural Land Consolidation Based on the Three-Concentration Principle

In recent years, Chengdu has carried out coordination works in urban and rural areas under the guiding idea of “three concentrations”, that is, industry, farmers and land are concentrated in centralized development area, urban area and large-scale operation respectively.⁵ The “Three Concentrations” are the general program of urbanization in Chengdu currently, the fundamental guiding principle in the management of agricultural regions and also the basis of investigation of the utilization of various policies and management nodes. Adhering to the principle of “three concentrations”, Chengdu Government implemented “land consolidation”, “golden land project”, “centralized residence of farmers” and other tentative measures, and vacated much collectively-owned land through demolition, amalgamation, relocation to centralized residence. The land was mostly used for urbanized or industrial development, partly returned for plowland, and partly developed for houses with limited property rights. The land consolidation is bringing about tremendous changes of traditional countryside's Lin Pan pattern, especially large-area Lin Pan destroyed at the boundary of rural and urban areas can be seen everywhere. Moreover, to pursue short-term benefit of agricultural operation, Chengdu also greatly advances large-scale operation of rural land, which is changing the farming mode with household as the unit fundamentally.

Under the “Three Concentrations” principle, the status quo of agricultural land protection system, and implementation and application of farmland protection fund is daunting. The achievement of basic farmland protection target is primarily exhibited by means of village migration and amalgamation, land consolidation, requisition-compensation balance and so on, ostensibly being digital “dynamic balance”, but materially losing the land for thousands of years and increasing new land which is incapable of forming high-efficient agricultural ecologic system in a short period. In addition, the actual effect of farmland protection fund implemented is not obvious⁶, the farmers are not active in farming, and even agricultural land is used for other purposes occasionally, making traditional agricultural system subject to severe test.

2.2 Fragmentation of Lin Pan Protection under Three-Concentration Principle

In 2007, *Planning of Lin Pan Protection in Western Sichuan* was prepared for various districts and counties of Chengdu under the premise of Three-Concentration Principle. The local government took Lin Pan protection planning as the channel of county land consolidation and farmland requisition-compensation balance and adopted separate protection of small residential quarters. For instance, in *Planning of Lin Pan Protection in Pi County* and *Planning of Lin Pan Protection in Wenjiang County*, Lin Pan protection is defined as follows:

“.....The planning of rural residence landscape protective construction in western Sichuan, as the supplement of the “three concentrations” planning, is the house building layout planning in rural areas beyond new rural communities and point layout construction of rural residence yards with preservation value relative to small-scale agglomerated point for scattered settlement, in this way to realize the full coverage of rural areas’ planning.....”⁷

“For the distribution features and value of Lin Pan in Wenjiang District, according to the principle of highly centralized flatland in the new countryside construction and layout planning, Lin Pans with certain scale and high value are protected at certain location.”⁸

It is obvious from the description above that land requisition-compensation balance, land consolidation and new countryside construction are the premise of traditional Lin Pan protection. Under such protection logic, the segments involving Lin Pans of Chengdu shows the tendency of fragmentation, and the understanding of historical heritage and countryside ecological system value is highly insufficient. For example, there are over 8700 Lin Pans in Pi County, while 301 are large-scale ones with more than 10 households living there mostly, accounting for 3.5% (from 1.9% to 17.9% for toher counties) of the total. Such protection is

point-oriented type with water ditches and rivers not included in the system. Furthermore, the protective measures mainly comprise house renovation of single Lin Pan, construction of infrastructure and reconstruction of landscape. According to my visit to various township governments of Pi County in October 2010, the understanding of related departments to Lin Pan protection was diversified, but generally focused on the combination of land consolidation with village migration and amalgamation, protection of large ones, and migration & amalgamation of small ones, or removal of houses with trees remained, or leveling for returning plowland. Few noticed the ecological function of Lin Pans and integrity of traditional intensive cultivation settlement. In the two overall investigation of Lin Pans in Pi County in 2004 and 2006 developed by local government, it was found that the number of Lin Pans in Pi County was rapidly reduced, from over 11,000 in 2004 down to over 8,700 in 2006 in quantity, and 25 Lin Pans/km down to 20 Lin Pans/km viewing from density. As per the tremendous change of the two years, the next round of urbanization shall be carried out according to our current awareness and protection mode. This reduction trend is inevitable and the unique human settlement unit derived from ancient Dujiangyan irrigation area in the Lin Pan of western Sichuan will be under more severe challenges.

2.3 Deep Risks of the Trend of Rural Land Marketization

In the unified design between the city and the countryside, Chengdu's reform also promoted "Rural Marketization"⁹. In 2007 and 2008, Chengdu issued related policies to advance the reform of rural land marketization, drive rural land to become capitalized, promote the reform of rural land and house property right system, boost the flowing of collectively-owned construction land and rural house property rights, stress the launching of rural assets to become capitalized and link the privatization of property right with farmland protection.¹⁰

The current logic of Chengdu to push forward related policies is to reuse the assets through land operation, make them enter the market and produce transactions, which is based on the thought of allowing rural house sites to circulate to create huge wealth. The failure of rural house sites to become wealth is because of the farmers' house sites failing to flow into the market due to the absence of identified property rights.¹¹ The land rights determination developed in the Chengdu Plain currently is the result of further marketization of rural land and the process of land transforming into assets. However, land capitalization and marketization does not mean that high depreciation of ecological value of the land. The trend of marketization is to make the transaction of land and Lin Pans legal and valid, forming capital converting process though the result is hardly to control (commercial, hotels or real estate?).

Land privatization may facilitate out-of-order urbanization of rural areas, bringing deep risks. Vice minister Qiu Baoxing has ever clearly stressed that the protection of public land in China shall not develop in the direction of strengthening private property rights in combination with urbanization development:

"(Currently) the reform targets at land property right's privatization or clarity to avoid the tragedy of public land, allowing thousands of farmers to protect the farmland as their own living house so as to reach the national land saving objective. However, this idea seemingly conforming to logic sense has long been broken up by the practice of western developed countries and developing countries and regions in Africa and South America relentlessly. The rapid urbanization of American land privatization system resulted in farm managers selling their land to the developers with one another, facilitating the spreading of low-density suburbanization. The land privatization in Africa and South America also led to the land owners to sell their land once for all, which caused most farmers without land to flock into big cities to form slums and poor agricultural yield."¹²



Figure 2: real estate development of Lin Pan in the Pi County

3. Advice on the Construction of the Protection Measures of Agricultural Improvement Area of Essential Farming Heritage Area

The development mode of the contemporary regional pattern of Chengdu Plain can be observed with the concept of dual subject of nature and artificiality (“intersubjectivity”) advocated by ecological philosophy. During the urbanization for nearly 30 years, the formation of regional pattern has been led mainly by the system of cities and towns. Under this kind of thinking, the urban construction land has been the main part while nature just the background usually overlooked, and the incessant enlargement of the urban city-built area without scientific guidance has caused the unbalanced development of agricultural and natural land and urban construction land pattern. To change the phenomenon, however, apart from insisting on the consistent concept of big city-growth limitation and coordinated layout of cities and towns, a dependable protection system in plain area needs to be constructed through a series of measures so as to reinforce the subjectivity of nature (including agricultural areas) and expedite the balanced development of the region.

The base of the unfolding of contemporary urbanization of Chengdu Plain is the essential agricultural area in Dujiangyan created by hard-working laboring people during thousands of years. The conflict of land with high quality and urban construction can be observed obviously in Chengdu Plain. As early as 1991, someone mentioned, “Just like the construction of natural reserve and the protection of rare animals and plants, the construction of cultivated land reserve is needed.”¹³ However, in recent years, though basic protection system for farmland has been constructed, the cultivated land protection has been basically unfolded in the logic of requisition-and-compensation balance, which thought highly of the quantity of farmland but attached little importance to the quality.

From the perspective of history, the traditional essential agricultural areas in Dujiangyan refers not only to the farmland with high quality, but also a living system entirely applying to the traditional artificial river basin in Dujiangyan, including basic elements such as artificial water network and woodlands, also places carrying traditional cultural life like counties and towns, and ancestral temples, and so on. From Song Dynasty, Dujiangyan mentioned by ancient people has not been just a headwork project, but has been referred to as the entire artificial basin system in the plain. Historian Tan Jihe thought, “As a world cultural heritage, Dujiangyan should be a complete concept, so the headwork area of Dujiangyan as the world cultural heritage at present can be expanded to the whole irrigated district and can then apply for world cultural heritage entirely as an extension project.”¹⁴ Current situation of the cultural heritage in Dujiangyan mainly refers to the headwork water engineering and is not expanded to the waterway of the plain and the living environment. Tan’s opinion attached importance to the heritage value of the whole irrigated district, combining the development of essential plain areas with the whole heritage protection.

During the urbanization of traditional European agricultural countries, agricultural area protection had been recognized as a key task and had also been tentatively explored by means of the technology method of “national parks”. Take Britain as an example. The formation of humanization of the earth caused by long-hour human activities makes it impossible for Britain to construct wilderness protection-leading systems of national parks in accordance with American modes. In England and Wales, the purpose of national parks construction is to on the whole provide modes for sustainable country management. “Landscape” (including the combination of nature and humanities) is identified as an important object of protection of national parks and protection measures of the highest level are formulated.¹⁵ In order to resist the “threat” to countries of urbanization, in 1926, England specially established Country Protection Society of England. Associated with other societies, CPRE positively asked for the construction of national parks in agricultural areas. Their romantic interpretation of cultural landscape was declared in National Parks Commission (1949), which was responsible for investigating and supervising country development and precluding the infringement of mining, agriculture, tourism and other commercial interest group, for the purpose of maintaining “traditional” agricultural lifestyles through prevention and protection. Later, in 1958, the national commission for country protection turned to be the rural commission.¹⁶

In recent years, Richard T.T. Forman, an ecologist, also put forward his conception of concentrated agriculture protection in the long-term ecological planning for Barcelona. He systematically studied the relationship between regional people and nature, formed the “agricultural parks” conception in the planning of “regional food system” and thought that concentrated protection of agriculture with large areas could not only reduce costs and enhance quality, but also save the value of landscape and ecology.¹⁷ Similar practice had been unfolded in areas with long agricultural history such as Belgium and Germany. This countries delimited “high-value agricultural areas”¹⁸ and its protection scope had exceeded the “open space”, developing in the direction of cultural landscape - focusing on various function value of traditional landscape, giving consideration to many aspects such as production, disaster prevention, aesthetics, recreation, education, and human habitat, including key elements like vegetation, waterway, and villages, in order to protect the sustainable development of traditional countries.

The urbanization of Randstad in Holland embodies another type of development way of agricultural area protection in city region. Before the massive urbanization, for the purpose of protecting traditional country areas, Randstad in Holland delimited the “green heart”, which mainly consisted of lowland agricultural areas formed by reclamation for hundreds of years. At the end of the 20th century and the beginning of the 21st century, the “green heart” had gradually become the “national landscape”, starting to be in combination with the protection action of the United Nations world cultural landscape, and became an independent administration area.

The construction of contemporary system for protection zone in China explores less of the protection in traditional agricultural areas, while Yunnan Hani terraced fields, the world cultural heritage, is an attempt of force and the heritage protection form of exploring the integration of traditional agriculture, landscape, and living environment.

No matter “heritage zone” or “national parks”, they both emphasize the entire protection of traditional large agricultural areas. The contemporary essential agricultural areas in Dujiangyan should use for reference the protection experience described above, expanding the heritage protection of Dujiangyan headwork to that of intensively cultivated agricultural areas in the plain, and agricultural protection areas with large scopes need to be delimited to change the development trend of current fragmentation to private property right. This protection form, on the one hand, has unity of plain irrigation area in aspects such as ecology and culture, and on the other hand, is another way of preventing agricultural areas from infringement during rapid urbanization. Agricultural areas need to be developed, but more

attention should be paid to the heritage and the entire ecological value. The contemporary essential agricultural areas in Dujiangyan have been seriously deteriorated, but quantities of ancient riverway and a number woodlands settlements are still conserved in counties like Wenjiang, Pixian, and Dujangyan. We can plan the counties as a whole, breakthrough the current protection situation of woodlands settlements of each county being protected one by one and the requisition-and-compensation balance of agricultural land, and in combination with the involved scope of traditional irrigation area of 17 counties in Dujiangyan, commonly map out the agricultural areas with higher historic heritage value and better ecological environment, delimit “essential agricultural heritage zone in Dujiangyan” by means of heritage protection theory, recognize as a whole cities and towns, woodlands, ancient riverway, essential farmland, ancestral temples, water culture, and so on, promote the dominant position of agricultural areas in the protection form of “essential agricultural heritage zone in Dujiangyan”, cooperated with urbanization, to expedite the construction of new patterns in the plain areas of Chengdu.

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