Rural Land Development and Use and Integrated Land Consolidation in Tongjiang County

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Abstract As important means of coordinating human-land relationship and realizing optimum allocation of land resources, land consolidation plays a great role in increasing effective farmland area and realizing dynamic balance of total farmland area. Land consolidation includes reallocation of land in space and adjustment of land relationship. This paper elaborated necessities for integrated land consolidation in Tongjiang County from project implementation, implementation situations, and implementation characteristics.

Key words Integrated land consolidation, Land development and use, New socialist countryside construction

1 Overview of the study area

Tongjiang County (N31°39′ - N32°33′ and E106°59′ - E107°46′) is a county in northeastern Sichuan Province. It is under the administration of Bazhong prefecture. With Wanyuan City in the east, Pingchang County in the south, Bazhou in the Bazhou County and Nanjiang County and Nanzheng County, Xixiang County and Zhenba County of Shaanxi Province in the north, Tongjiang County has a total land area of 4 125.60 km^2. There are 14 towns, 74 tonwships, and 521 administrative villages in the whole county. In 1996, the total population of Tongjiang County was 696 240, and the population density reached 169 people/km^2. The agricultural population was 633152, accounting for 90.9% of the total population.

2 Existing problems in rural land use

2.1 Regional difference in land use is distinct Tongjiang County is situated in lower and middle mountain areas and has the relief of "three mountains containing two valleys". Due to differences in natural conditions and development history, there are huge differences in economic society and land use form. The southern medium cutting low mountain area is the most developed area of the whole county, manifested in the fact that planting land and non-agricultural construction land take up a larger portion in total land area. Its unit area economic output is obviously higher than central and northern areas. However, due to excessive land development and serious damage of forest coverage, ecological environment is outstanding. Central medium mountain area is forestry and livestock breeding area. The proportion of various land use types is relatively reasonable, but the economic output is far lower than southern medium cutting low mountain area. Northern medium mountain area is forestry area of Tongjiang County. In this area, farmland area is small and separate and the problem of farming at steep slope and water and soil loss are serious.

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2.2 There is large population but little land and the human-land conflict is outstanding The whole Tongjiang County has land area of 0.59 hectare and the per capita farmland area is 0.08 hectare, which is far lower than the average national level. With constant growth of population and blind wasteland opening up and farming, effective farmland area is decreasing rapidly and the per capita farmland area is also decreasing, leading to increasingly outstanding human-land relationship.

2.3 Land use structure is unreasonable and land use benefit is low Land use structure is simple and it neglects comprehensive use of land resources. Agriculture is the major land use type. As a result, it influences comprehensive and coordinated development of national economy and social cause. Firstly, in the proportion of agricultural land use, the proportion of forestry, animal husbandry and fishery accounts for 81.3%, while the output value is only 16.7%. In farmland, grain production takes up the major part, while economic forest land takes up a small portion of forest land. The resource advantage fails to turn into advantage of commodity economy. Also, the agricultural economy of Tongjiang County has not broken the traditional mode completely. The production structure is backward. To realize transformation of traditional agricultural commodity to commodity agriculture, it is required to adjust agricultural structure. Secondly, the proportion of industrial land is small and it is unable to bring land development in depth and the economic benefit of land use is relatively low.

2.4 Water conservancy facilities are insufficient and limit development and use of land resources In the whole Tongjiang County, there are few water conservancy facilities. Besides, existing water conservancy projects are not perfect. There are many defective projects. What's worse, many projects have low benefit. In addition to complex terrain and restriction of economic and technological conditions, it is difficult to establish perfect water conservancy irrigation network, which is a great factor restricting full play of potential of land resources[5].

2.5 Extensive land use leads to serious damage of land resources Urban and town constructions pay little attention to

connotative development, but blindly pursue expansion of extensional area. Urban construction occupies and nibbles much farmland and vegetable land. In addition to lack of unified planning in construction, it results in excessive waste of farmland. Apart from these, natural disasters result in great damage to farmland. Slackness in capital construction of farmland and water conservancy projects leads to drop of farmland resisting natural disasters and turns fertile farmland to barren farmland.

2.6 Land use lacks plan and the macro-regulation is inadequate For a long time, land use of Tongjiang County lacks overall planning. Land management is separate and land policies are issued by many departments. In capital construction, relevant departments only focus on investment scale, but pay little attention to area of land expropriation, reasonable use and compensation. And it lacks feasible research and well established policies and regulations. As a result, there is frequent occurrence of more expropriation but less use in non-agricultural construction land, or expropriation but no use. After implementation of *Land Administration Law*, the problem of illegal occupation and use of land is effectively controlled. However, due to lack of overall planning of land use and lack of scientific basis of macro-control, construction land is always supplied according to demand and it lacks restrictive mechanism. In consequence, the situation of unreasonable land use is widespread.

3 Current situation of integrated land consolidation projects

Since 2005, Tongjiang County started preparation for implementation of integrated rural land consolidation project, namely "gold land" project. With 6 years of effort, by the end of 2011, Tongjiang County Bureau of Land and Natural Resources had successfully applied for declaration of 40 integrated rural land consolidation projects, implemented 17 central and provincial level financial investment projects, and put in place funds up to 200 million yuan. These include 5 central financial investment projects (3 land consolidation projects, one subsidy project of land development, and one land reclamation project), 15 provincial level financial investment projects (9 investment land consolidation projects, one investment land development project, and 5 subsidy farmland reclamation projects). The development and consolidation land reached 59 300 mu; Tongjiang County built water pools in hilly areas, water conservancy project and channel, completed farmland water conservancy project, and changed current planting situation of living at the mercy of the forces of nature; it renovated field roads, changed farmers' farming methods, and basically realized production mechanization of agricultural products, and finally increased yield of agricultural products, and also increased farmers' income.

4 Potential of rural land consolidation

The potential of land consolidation[7] refers to possible capability of increasing available space of land to be consolidated by a series of administrative, economic, legal and technical measures, to increase land productivity, reduce production cost, and improve ecological environment. From the connotation, the potential of land consolidation is the latent capacity of land use with restriction of economic and ecological conditions relative to certain land consolidation standard. From the source, the potential of farmland consolidation mainly comes from consolidation and improvement of rural roads, irrigation ditches and channels, and merge and consolidation of fields, transformation and elimination of limiting factors, and building and improvement of farmland shelter forest network.

Table 1 Survey of current land consolidation situation in some towns of Tongjiang County

Place of land development and consolidation project	Construction scaleMu	New farmland Mu
Yinshanping Town	1191.00	930.00
Tiefo Town	11089.70	1350.60
Lianhuasi Town	2250.00	1698.80
Guangna Town	12254.30	1502.60
Banqiaokou Township	9705.90	1373.60
Sanxi Township	12835.40	1402.56
Caochi Township	9936.30	1167.50

Note: selected from statistics of Tongjiang County Bureau of Land and Natural Resources.

4.1 Farmland consolidation potential At present, farmland consolidation carried out in China mainly belongs to infrastructure construction. In other words, it is to improve farmland water conservancy and traffic infrastructure through improvement of farmland consolidation. Objects of farmland consolidation generally involve farmland itself, farmland road in traffic land, irrigation canals and ditches in water land, marine construction, and raised path through fields in unused land[8].

4.1.1 Potential of farmland in expanding available space. The expansion of available space of farmland is manifested in increase of effective use area after farmland consolidation. That is effective farmland area increased through integrated consolidation of roads and irrigation canals and ditches. In rural areas of China, many roads and ditches lack overall arrangement in distribution, leading to repeated construction and large occupation area. Besides, due to out of repair for long years and no management, some facilities are idle and wasted and the utilization ratio is relatively low. Therefore, in farmland consolidation, restoring these idle and waste roads and canals and ditches to direct production land can increase effective farmland area[9].

4.1.2 Potential of increase of farmland productivity. Due to influence of terrain, landform, and geographical position factors, there is certain difference in productivity of land parcels. On the condition that the above factors are unchanged, the land productivity is also influenced by irrigation and drainage facilities, and soil layer thickness. When farmers increase input and operation funds for farmland, it is able to realize improvement of farmland productivity. In line with existing problems of different areas, it is possible to take different measures to improve land productivity. In areas with higher altitude in Tongjiang County, such as Tiexi

Town, Yongan Town, and Zhicheng Town, it is recommended to concede the land to forestry, plant industrial crops, and increase canopy density of forest land. Secondly, it is recommended to build farmland forest network in surrounding areas, establish vegetable base and breeding base, increase multiple crop index of farmland, and increase farmers' economic benefit. Thirdly, in adjacent areas of Tongjiang County, it is recommended to improve farmland water conservancy facilities, increase effective irrigation area of farmland, increase flood prevention and drought resistance ability of farmland, and increase ability of farmland to resist natural disasters, so as to guarantee increase of grain yield.

4.1.3 Potential of improvement of ecological environment. At present, China's farmland consolidation usually pursues maximal economic benefit, but neglects construction and improvement of ecological environment, such as excessive use of cement in road and ditch building, especially "smooth design for three sides of ditches" not only increases investment, but also influences ecological environment and obstructs dispersal of farmland species; mechanical leveling damages topsoil and reduces organic matter, easily leading to structural degradation. In the process of China's farmland consolidation, the improvement of ecological environment is mainly manifested in (i) improving farmland micro-climate through building farmland shelter forest network; (ii) improving atmospheric environment surrounding farmland area through conserving water and cleaning air; (iii) forming beautiful landscape of "square field, rows of forest, connected ditches and roads" through integrated consolidation of agricultural land, to increase local landscape benefit[9].

4.2 Potential of consolidation of garden land In Sujiaping Village of Yanxi Township and Chaoyu Village of Xinglong Township, there is 1500 mu fine tea breeding site, including 600 nursery garden, 600 mu cutting garden, 300 mu fine seed introduction and breeding demonstration garden, with annual output of 90 million plants, available for 15000 mu garden. Luocun Tea Company selected excellent tea varieties with high ability of resisting cold, early sprouting and uniform sprouting, and excellent suitable system. It has cultivated 7 local excellent fine varieties, such as Luocun Mingmei and Tian'gang Yinya, and basically realized self-sufficiency of tea seedlings in project area. In the tea garden, it built 31 water supply points, 32 water reservoirs, 18 water pools in hilly areas, and 15 km channels, provided water for 2356 households and 35600 mu tea garden.

4.3 Potential of consolidation of rural residential areas

Rural residential areas refer to concentrated areas of rural residents below organic towns. These include towns and villages. The objective of consolidation of rural residential areas is to explore the land use potential of existing rural residents, increase area of agricultural land, improve infrastructure and living facilities of central villages, build style and feature of new countryside, and create excellent living environment for farmers.

Consolidation of rural residential area is to drop current per capita construction land to specified per capita construction land, so as to consolidate land saved to agricultural land. Firstly, it is recommended to consolidate rural old homestead, and drop current per capita land use criterion to specified per capita homestead criterion. With development of rural economy, due to lack of strict management and scientific planning, rural homestead seriously exceeds standard. Many villagers do not give up old homestead after building new houses. As a result, they have two or more homesteads. Through consolidation of old homestead, it is required to return excessive land or old homestead to farmland, so as to increase agricultural land. Secondly, it is recommended to properly increase the floor area ratio. In China, many rural buildings are bungalows, so the floor area ratio is low. In this situation, consolidation of rural residential area should establish rural resident concentration area, and gradually increase the floor area ratio of rural residential area, to increase agricultural land. Thirdly, it is recommended to make consolidation of rural idle land. In rural residential areas, many villagers occupy land in the form of enclosing large yard. As a result, much land is unused. Making integrated consolidation of such land can increase area of agricultural land[9].

4.4 Potential of consolidation of other unused land

Tongjiang County is situated in mountain areas. Some areas have altitude above 800 m. The terrain is complex, leading to some land unused. Through integrated land consolidation, it is recommended to foster and apply fertilizer, to develop farmland favorable for agricultural planting.

5 Conclusions

Integrated consolidation of agricultural land is a comprehensive systematic project. In the process of new socialist countryside construction, it is required to arrange land development consolidation project and land reclamation projects in accordance with overall objective of new socialist countryside construction. In the formulation of overall land use plan, it is required to firstly incline towards main grain producing areas and capital farmland protection project, especially high standard capital farmland construction, turning low yield farmland to high yield farmland and realize centralized large-scale operation of farmland. Secondly, it is recommended to launch consolidation of old villages, cancel townships and merge towns, cancel villages and merge residential areas, to make population more concentrated and farmers' houses centralized in central villages, and completely transform rural living environment and village outlook. Combining overall land use plan, state-owned department and construction department should cooperate to demolish old villages and build new ones. For example, in Chengxi Village of Nuojiang Town, Qujiang Village of Guangna Town, and Shaojiahe Village of Yangbai Township, it is feasible to build rural residential areas to realize outlook of new socialist countryside.