Provincial-level Land Consolidation and Ecological Environment Protection Based on the Perspective of Planning

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Abstract Based on the understanding of current land ecological environment in Anhui Province, we mainly analyze the relationship between land consolidation planning and ecological environment, and point out the problems concerning ecological environment, such as great soil erosion, serious soil pollution, frequent geological disasters in local areas, and forest vegetation destruction. We divide the key ecological function conservation areas into the following areas: River Source Area, River and Flood Regulation and Storage Area, Key Water Conservation Area, Wind-preventing and Sand-fixing Area, Soil and Water Conservation Area. Finally we put forth the ecological security strategy for promoting land consolidation and ecological environmental protection.

Key words Comprehensive control of land, Ecological environment protection, Anhui Province

1 Introduction

National Land Use Plan (2006 - 2020) stresses that we should strengthen the land ecological protection and construction; protect the basic ecological land; increase efforts in governance of land ecological environment; take actions that suit local circumstances to improve the land ecological environment, and promote the building of environment-friendly society; build the land use pattern with good ecology[1]; adjust the layout of the various types of land, to gradually form the spatial pattern with reasonable structure and complementary function. It points out the direction for the relationship between the land use and ecological environment.

The land consolidation planning is the special plan in the overall land use planning. The land consolidation is an important means to promote farmland protection and achieve the goal of intensive land use, and also an important platform for promoting urbanization, new rural construction, and integrated urban-rural development, but at the same time, it will inevitably have a certain impact on the regional ecological environment. In a new round of revision of land consolidation planning, carrying out the research on land consolidation and ecological environmental protection is of important theoretical significance and practical value.

2 The current situation of ecological land use in Anhui Province

According to the latest data in 2010, there is a total area of 6 042 855.38 hm^2 of ecological land in Anhui Province, accounting for 43.12% of the total land area in Anhui Province. The area of natural ecological land is 4 985 647.85 hm^2, accounting for 82.50% of the ecological land area in the province; the area of artificial ecological land is 1 012 543.42 hm^2, accounting for 16.76% of the ecological land area in the province; the area of potential ecological land is 44 664.11 hm^2, accounting for 0.74% of the ecological land area in the province[2].

Table 1 The current situation of ecological land use structure in Anhui Province (2010)

Ecological land type	Sub-type	Area//hm^2
Natural ecological land	Orchard	145 563.76
	Tea garden	148 771.40
	Other types of garden	60 631.98
	Forest land	3 406 928.22
	Shrub land	101 480.76
	Other woodland	269 222.14
	Natural pasture	221.89
	Other grassland	79 631.77
	River water surface	304 845.45
	Lake water surface	340 250.79
	Inland tidal flat	126 214.90
	Wetland	1 884.79
	Subtotal	4 985 647.85
Artificial ecological land	Artificial pasture	163.46
	Scenic spot facility land	29 431.38
	Reservoir water surface	108 462.96
	Pond water surface	524 898.85
	Ditch	349 586.77
	Subtotal	1 012 543.42
Potential ecological land	Sandlot	735.73
	Bare land	43 892.73
	Saline and alkaline land	35.65
	Subtotal	44 664.11
Total		6 042 855.38

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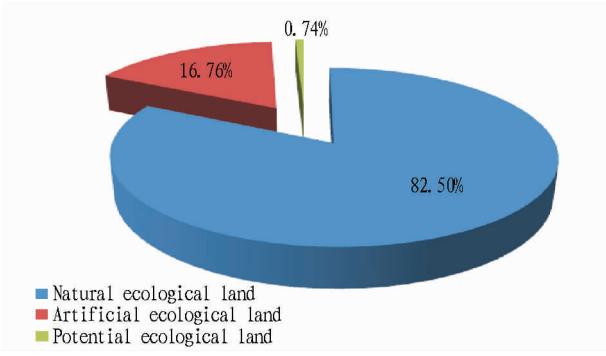

Fig. 1 The ecological land use structure in Anhui Province (2010)

3 The ecological environment problems in Anhui's land use

3.1 Great soil erosion Anhui Province is one of the provinces with serious soil erosion in China. Since there are many mountains and hills in Anhui Province, with serious soil erosion, although through long-term various forms of governance and building, the soil erosion area still accounts for 25.8% of the total land area in entire province at present. The soil erosion is mainly concentrated in the mountainous areas in the south of Anhui Province, the Dabie Mountain area and Jianghuai hilly area; due to land cultivation on steep slopes and vegetation destruction, the soil erosion intensity is increased in some mountainous areas[3].

Table 2 The basic situation of soil erosion in Anhui Province

Distribution area	Soil erosion area//km²	Share//%	The area of moderate and severe soil erosion//km²			
			Moderate	Severe	Total	Share//%
The Dabie Mountains	10 171.6	72.0	4 376.1	713.6	5 089.7	50.0
The mountainous areas in the south of Anhui Province	11 266.8	37.1	3 770.0	300.0	4 070.0	36.1
Other regions	1 489.1	4.3	1 104.25	33.0	1 137.25	7.8
Entire province	35 927.5	25.8	9 250.35	1 046.0	10 296.95	28.7

3.2 Serious soil pollution Land contamination includes soil pollution and water area pollution. The generation characteristics of the soil pollution are as follows: the pollutants (such as solid waste, pesticides, fertilizers, *etc.*) are directly leached into the soil by rainwater, especially the excessive discharging of the Three Wastes-industrial wastewater, waste gases and residues, makes a lot of water and soil unusable, imposing extremely adverse impact on the growth of crops.

The serious water pollution is mainly caused by the discharging of industrial sewage. In the Huaihe River basin, there is the situation of nearly all water being contaminated; Chaohu River is in a moderate state of eutrophication; the pollution load is increased in the Yangtze River basin and Xinanjiang River; water pollution leads to water ecological imbalance, and Huaibei Plain has become the province's most ecologically fragile area.

3.3 Frequent geological disasters in local areas Anhui Province is one of China's provinces with frequent geological disasters, where the geological disasters cover a broad area, but the scale is small, mainly seen in the Dabie Mountains and the mountainous areas in the south of Anhui Province. According to the statistics, there were a total of 338 types of geological disaster in the province in 2010 (mainly landslides and collapse hazard).

3.4 Forest vegetation destruction The forests in Anhui Province are mainly distributed in the mountainous areas in the south of Anhui Province and the Dabie Mountains; the hilly areas in the southeast of Anhui Province are also forest areas; the warm temperate zone forest vegetation in the north of the Huaihe River still remains in part of Suzhou City.

The spatial continuity of the province's forest vegetation is seriously damaged, forming the residual pattern of "more vegetation in the south but less in the north, more mountains but less plains and hills"; the system structure and function are not improved significantly; the total amount of forest resources is small, with low rate of accumulation; the contradiction between resource utilization and resource potential protection is still outstanding.

4 The building of land consolidation and ecological environmental protection

In accordance with the ecological security strategy pattern in Anhui Province, it is necessary to strengthen land ecological protection and construction, protect the basic ecological land. Based on the dominant ecological functions in various functional areas and social and economic development direction within the functional areas, put forward by *Ecological Function Zoning of Anhui Province*, we mark off the key ecological function conservation areas (Fig. 1).

The land consolidation activities within this area should take ecological dominant function as constraint, and it is necessary to carry out the land consolidation projects that suit local circumstances. At the same time, we should strengthen governance of land ecological environment, improve land ecological environment according to the actual situation, and promote the building of environment-friendly society[4-9].

4.1 Accelerating the building of land ecological network system

4.1.1 Promoting the building of strategic pattern of ecological security. According to the regional natural conditions and the positioning of main function, there is a need to accelerate land consolidation, and build the ecological network pattern of Anhui Province, namely building the ecological security strategy pattern, with the forest ecological security barrier, river net and shelter belt, farmland shelter belt, and the backbone road forest ecological security network in the Dabie Mountain area, the mountainous areas in the south of Anhui Province and the Jianghuai hilly areas as the main body; with the ecological function

areas of large and medium-sized rivers and lakes such as the Yangtze River, the Huaihe River, and the Chaohu Lake as the skeleton; with key ecological function areas as important support; with various types of conservation areas, natural cultural heritage site, forest park, geological park, scenic spots, and flood storage areas as the components.

4.1.2 Promoting the ecological security barrier building of land. We must build the land ecological security barrier with a large area of contiguous forest, grassland and basic farmland as the main body. In the layout of urban and rural land, a large area of contiguous basic farmland, especially high-quality farmland, is regarded as an important part of the ecological security network, conducive to building the livable environment with beautiful scenery in which man and nature are in harmony.

4.1.3 Strengthening ecological environmental protection in the hilly areas. In the Jianghuai hilly areas, we should implement the land consolidation activities with basic construction of farmland as center, to control soil erosion, strengthen wetland protection, and promote comprehensive watershed control; focus on building of Chaohu water functional area; build the western Anhui water conservation functional area, with Jinzhai, Huoshan, Yuexi as the core, to enhance biodiversity conservation; promote the ecological construction in the Dabie Mountain area and Jianghuai hilly area.

4.1.4 Strengthening afforestation to give play to an overall effect. In the mountainous areas, we should focus on the construction of water conservation forest, soil and water conservation forest and economic forest; in the plain areas, we should focus on the construction of windbreak and sand fixation forest. It is necessary to strengthen the protection of wetland along the Yangtze River, build the Yangtze River ecological shelterbelt, and carry out the project of returning farmland to wetland and wetland ecosystem restoration, to promote the construction of ecological protection areas along the Yangtze River.

4.1.5 Strictly protecting all kinds of basic ecological land. We should strictly control the development and utilization of basic ecological land, such as natural woodland, natural grassland and wetland. For the development of unused land, such as swamp and tidal flat, we should advance orderly in accordance with the planning strictly, under the conditions of protecting and improving ecological environment.

4.2 The key ecological function conservation areas of land consolidation

4.2.1 River Source Area. The upper reaches of tributaries of the Yangtze River and the Huaihe River, the upper reaches of the Xinanjiang River, and the upper reaches of rivers into Chaohu Lake, are the main sources areas of river in Anhui Province, whose dominant function is to maintain and improve the source's runoff capacity and water conservation capacity; whose auxiliary function is to protect biological diversity and maintain soil and water.

4.2.2 River and Flood Regulation and Storage Area. River and Flood Regulation and Storage Area mainly refers to the lakes and other wetlands along the Huaihe River and the Yangtze River, whose main function is to maintain and improve the natural ability to reduce flood peak and store flood; whose auxiliary function is to preserve biological diversity, protect important fishing areas and maintain the water body's natural purification capacity.

4.2.3 Key Water Conservation Area. Key Water Conservation Area mainly refers to the important water conservation functional areas in the Dabie Mountain area, and the mountainous areas in the south of Anhui Province, whose dominant function is to maintain and improve the capacity of water conservation, runoff replenishment and adjustment; whose auxiliary function can be determined according to the type of ecological function conservation area (For the natural water conservation areas, the main auxiliary function is to protect biodiversity; for the artificial water conservation areas, the main auxiliary function is to conserve soil and water, maintain natural purification capacity of water.).

4.2.4 Wind-preventing and Sand-fixing Area. Wind-preventing and Sand-fixing Area mainly refers to the old course area of the Yellow River, whose dominant function is to prevent wind and fix sand; whose auxiliary function is to protect the biodiversity and fruit production.

4.2.5 Soil and Water Conservation Area. Soil and Water Conservation Area mainly refers to the area in the southwest of Anhui Province with serious soil erosion, whose main ecological function is to carry out soil erosion prevention and supervision.

4.3 Restoration and reconstruction of degraded land ecosystem

4.3.1 Strengthening comprehensive control of soil erosion. It is necessary to active use engineering, biology, farming and other measures, to control soil erosion and improve the ecological environment and production conditions.

In Jianghuai hilly area, mountainous and hilly area in the south of Anhui Province, the Dabie Mountain area and other areas, we should implement comprehensive land control, and carry out slope land governance, barren hill governance, open forest land governance, and ravine governance.

In the areas with serious soil erosion, we should take natural ravines and small basin as unit, to implement comprehensive planning and comprehensive control, and establish comprehensive control system of soil erosion[4].

4.3.2 Restoring the ecological function of abandoned land. Through comprehensive control of the ecological environment, we should restore the vegetation and ecosystem in the mining area, improve the ecology and living environment in the mining area; establish the earnest money system for the restoration of ecological environment in the mining area, and implement strict ecological environment accountability system; timely reclaim abandoned land for industry and mining, improve the self-healing capacity of waste land ecosystem in the mining area, restore and reconstruct the degraded ecosystem.

4.3.3 Enhancing the comprehensive benefits of farmland conversion for ecology. We have to strengthen the supervision on returning farmland to forest, and establish the long-term mechanism for improving the ecology, increasing farmers' income and promoting economic development in the areas where farm-

land is returned to ecology.

On the basis of survey, research and experience summary, we should strictly define the standard of farmland conversion for ecology, and scientifically formulate and implement the planning for the project of returning farmland to forest, to effectively improve the economic benefits, social benefits, and ecological benefits of returning farmland to forest.

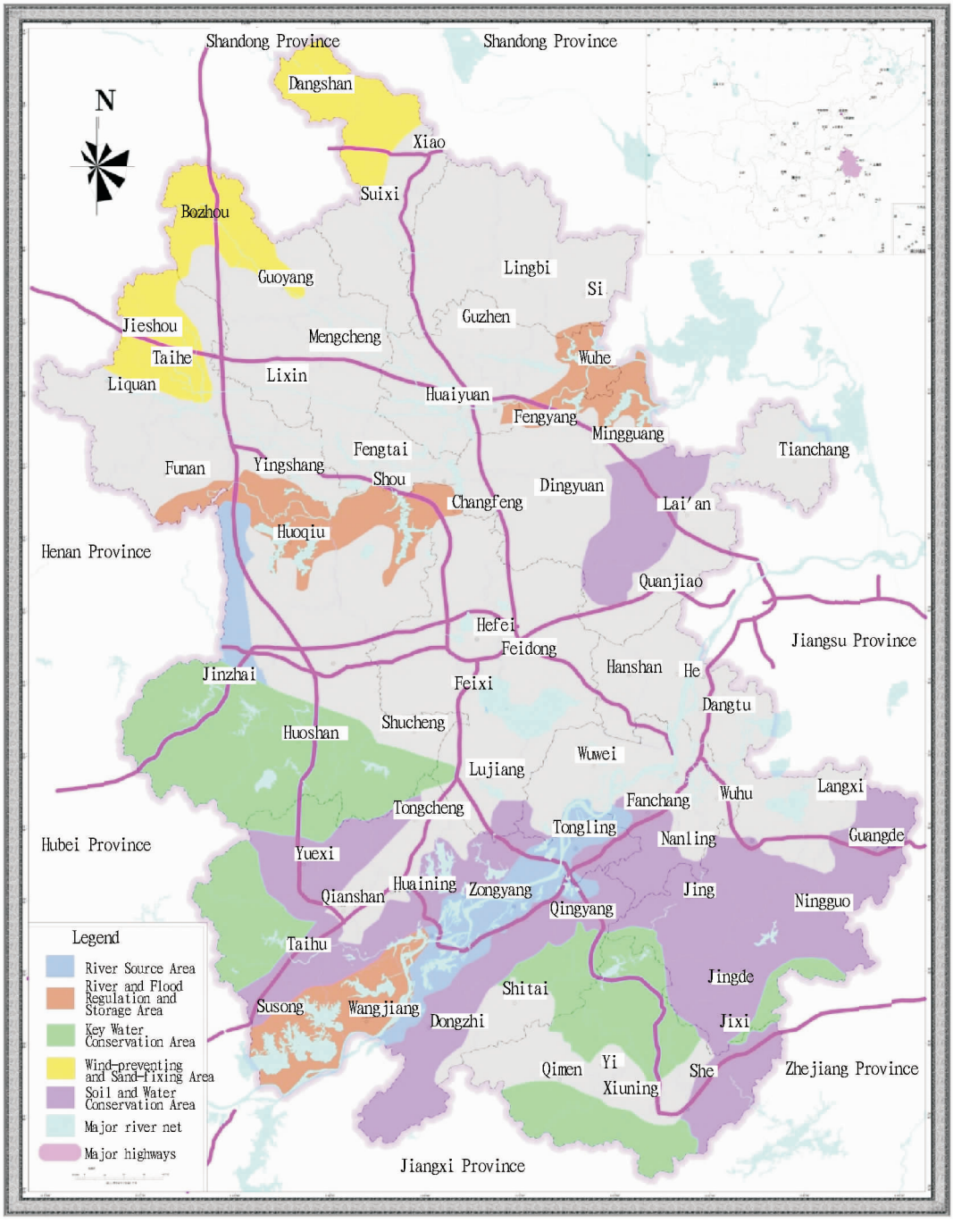

Fig. 2 The key ecological function conservation areas of land consolidation in Anhui Province

4.3.4 Strengthening desertification control in the plain areas. It is necessary to establish the comprehensive farmland prevention and protection system based on afforestation, to reduce sandstorm, regulate climate, conserve water and soil.

In the forestation-suitable land along the Yangtze River and the Huaihe River, we can build a green corridor; in the north of Anhui Province, there is a need to carry out sand control and afforestation, build good farmland ecological barrier.

4.3.5 Strengthening comprehensive control of ecological environment. In the mountainous and hilly areas with hidden trouble of geological disasters, we should vigorously promote

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his uncovering village head's selling collective land illicitly and corrupting materials and capitals for transformation of rural electrical network. ZYH said that he is incapable of leading villagers to get rich, but he has right to monitor act of village cadres, to make them provide better service for villagers. In our survey, we also found that nearly all migrant workers returning to hometown for starting an undertaking have participated in local public utility construction, such as repairing road, installing road lamps, donating to help poor students, and subsidizing to develop charities. For example, ZSZ from Village Z is the deputy director of the village committee and also the boss of a local clothing factory. He donated 50 lamps along the main road in Village Z. Knowing the " Safe Construction Project" launched by the township government, he donated 100 miner's lamps.

3 Conclusions

" The end of farmers" put forward by Mendras and " the end of villages" introduced by Chinese sociologist Li Peilin finally become realistic at the background of the big tide of migrant workers returning to hometown for starting an undertaking. Openness and modernity of those migrant workers are higher and higher, and social demands become more and more, marks of traditional farmers on them gradually disappear [9]. What does those migrant workers pursue is not the " survival" type self-development in small peasant sense, also greatly different with " social small peasant" described by Professor Xu Yong. Through starting an undertaking or electing for village cadres, those migrant workers become " development type" social farmers. Typical characteristics of traditional farmers disappear, and the end of farmers firstly is shown from those migrant workers. In addition, migrant workers' undertaking is generally in counties, urban fringe areas and central towns, few are in cities. These not only increase actual population and total supply and demand, but also provide a " demonstration" effect for migrant workers' action of starting an undertaking, to promote more people to start an undertaking, radiate from downtown to central towns, then to villages. Those migrant workers frequently move between urban and rural areas, and gradually get incorporated into the urban and rural integration. This breaks traditional geographical boundary of villages and realizes the end of villages. In this course, migrant workers returning to hometown for starting an undertaking play a role of utmost importance and they are media of village changes and promoters of rural civilization development.

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the comprehensive land control, and active prevent geological disasters.

For the areas with grade of slope more than 25° in the Dabie mountain area and Huangshan Mountain area, we should gradually implement returning farmland to forest and ecological relocation; take small watershed as a unit, to carry out comprehensive control of small watershed, comprehensive control of slope land, and the control of collapse mound; take full account of the environmental capacity and ecological carrying capacity, strictly restrict the land development and utilization in geological disaster-prone areas, and effectively protect the ecological environment.

4.3.6 Vigorously promoting the prevention and control of land contamination. It is necessary to adhere to the policy of " prevention first, comprehensive control" , to reduce the discharge of pollutants; strictly prohibit the use of contaminated water to irrigate farmland, and comprehensively renovate the soil environment; strengthen the comprehensive control of farmland contaminated by organic pollutants and heavy metals; establish the evaluation and supervision system of land environmental quality.

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