Center Spatial Identification of Jinzhai Urbanization in Anhui Province under the Mode of Ecological Civilization Evelopment

Longjiang Du*

Institute of Water Resources and Hydropower, Beijing, 100038, China

dljgood@163.com

*Corresponding author

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1. Introduction

Ecological civilization is a development model rationally selected in the process of promoting new industrialization, urbanization and agricultural modernization in the new era in China. Spatial identification of county urbanization is the core problem that needs to be solved and faced in promoting the construction of ecological civilization in China. Based on this understanding, this paper, taking jinzhai county, anhui province as an example, proposes the spatial identification and analysis method of county urbanization under the base line, satisfaction and ideal ecological security pattern, and clarifies the selection direction of ecological security pattern under the guidance of different development goals, as well as the corresponding division types of suitable areas, restricted areas and suitable areas.

2. Research area, data and methods

2.1 overview of the research area

In recent years, China has proposed vigorously promoting the construction of ecological civilization and established the strategic position of ecological civilization construction. At present, the soil erosion sensitivity in dabie mountain area is high, the ecosystem of mountain area is degraded, the soil erosion is intensified, and the flood disaster incidence rate of middle and lower reaches is increased. In the national main functional area plan, Jinzhai County is designated as the spatial area of "dabieshan soil and water conservation ecological functional area", and it is an important water supply area in the middle reaches of the Huaihe River and the lower reaches of the Yangtze River. Therefore, the selection of jinzhai county as the research area of urbanization spatial identification of county-level development subjects under the mode of ecological civilization development has a good reference significance and practical value for other county-level development subjects in mountainous areas in China.

Jinzhai county is located in north latitude 31° 061 '- 481° 31', longitude 115° 111 '221' - 116° between, for the hubei, henan, and anhui provinces at the junction, located in the hinterland of the dabie mountain in anhui province and Shi He river, west the p.i with its tributaries from southwest to northeast throughout the territory; The whole county covers an area of 3,814 square kilometers, of which the mountainous area and hilly area account for 91.6%, the hilly area and hilly area account for 7.4%, and the forest coverage rate reaches 73.65%.In 2011, the county's GDP reached

7.22 billion yuan, with an average per capita of 10,800 yuan. It has a registered population of 677,000 and a permanent resident population of 504,000.

2.2 Data selection

The basic geographic data of the study area is based on 1:100,000 scale electronic map of Jinzhai County, including digital elevation model, river network data, county boundary administrative division, etc.The data of urban and rural land use classification is based on the TM satellite image of Jinzhai County. The data are respectively from 1987, 1992, 1995, 2000, 2004 and 2009, six years from June to October.

The basic data of nature, society and economy in the study area are mainly used from 1980 to 2009 in all counties and cities of anhui province, including population, GDP, flood disaster area, disaster population, direct economic loss, etc., and the data are from anhui provincial department of civil affairs.In addition, precipitation data in the study area were collected from the meteorological bureau of anhui province from 1980 to 2009.

2.3 Selection of research methods

This study mainly USES 3S (GIS/GPS/RS) integrated spatial analysis method to analyze the ecological history evolution, ecological security status and ecological security pattern of jinzhai county. The spatial distribution ratio of remote sensing data is 30m x 30m. Image registration is conducted with 1:100,000 topographic map as the base map. The error is controlled by 0.5 pixel.

The normalized vegetation index (NDVI) was used as the inversion data for the ecological and historical evolution of Jinzhai County. Due to its universality, NDVI can be used to monitor the change of vegetation cover on a large scale, and can also be applied to research on small scale areas, especially in ecologically fragile areas. Vegetation index is an important indicator of regional ecology, which is calculated according to the characteristics of vegetation reflection band to reflect the changes of vegetation cover. Generally, the normalized vegetation index value is less than or equal to 0 and basically no vegetation cover, which is used for building, bare land or water surface. More than 0 area has vegetation cover and the higher the value of coverage is. Taking 0 as the threshold value, vegetation cover and non-vegetation cover area can be distinguished. Except that the surface area remains basically stable, the change of vegetation cover in different periods can be regarded as the direct result of human development, that is, land development intensity can be distinguished by using threshold treatment (without considering farmland change).Generally, vegetation index and vegetation coverage have a strong positive correlation, and the higher the vegetation index, the greater the vegetation coverage.Conversely, the higher the vegetation coverage, the higher the vegetation index.

NDVI can be expressed as:

$$NDVI=(p(nir)-p(red))/(p(nir)+p(red)) \quad (1)$$

To judge the current situation of ecological security and ecological security pattern, multi-map layer factor superposition analysis, buffer zone analysis and spatial modeling technology in GIS were used to calculate the weight of multiple factors on the target image superposition, extract the potential information that could not be recognized by a single factor, and complete the complex spatial analysis task. Single factor GIS analysis includes DEM extraction, slope analysis and flood risk analysis. Multifactor superposition analysis includes the analysis of inhabitability, evaluation of ecological security pattern and layout of planning scheme.

3. Evolution process and characteristics of ecological pattern in jinzhai county

The relationship between people and land (i.e. land use pattern) is the most influential and far-reaching factor to the ecological environment, as well as the core factor influencing the development of urbanization. The evolution mechanism and characteristics of human-land relations are not only related to the innate natural geographical conditions, but also have a profound impact

on the development of human-land relations. Therefore, it is the primary cognitive premise to promote county urbanization under the development mode of ecological civilization. The water and heat condition of Jinzhai County is superior, the vegetation grows luxuriantly in natural condition, the man-made social and economic activity can cause the large area bare land to form. In this case, the relationship between people and land in Jinzhai County is positively correlated with vegetation coverage, which can be quantified by vegetation index. By analyzing the land development area of Jinzhai County in six times in 1987, 1992, 1995, 2000, 2004 and 2009, the following table -1 is obtained. From the "3S" integrated spatial analysis and the normalized vegetation index analysis, the impact of the evolution of the human-land relationship on the ecological spatial pattern in Jinzhai County can be roughly divided into the following stages:

Table 1. Statistical table of land development intensity of jinzhai county (1987-2009) unit: km^2

year	1987	1992	1995	2000	2004	2009
NDVI>0	2587.04	2430.28	2313.57	2457.74	2614.50	2523.72
NDVI<0	1226.96	1383.72	1500.43	1356.26	1199.50	1290.28
NDVI<0	32.17%	36.28%	39.34%	35.56%	31.45%	33.83%

3.1 Before 1995, the destruction of county ecological pattern was accelerated year by year

Before 1995, China's rural reform and development was an important period, but also rural reform in support of urban development. During this period, China's development mainly achieved rapid urban agglomeration and development by limiting population flow and "knife gap" between workers and peasants. For the farmers in Jinzhai County with few mountains and a rapidly growing population, only the development of land from the hillside can basically maintain family life. Therefore, according to the normalized vegetation index analysis of the image map, the intensity of land development of farmers in jinzhai county increased year by year during this period, and the land area of NDVI> in 1995 reached a high value of 39.34%.At present, the serious soil and water loss in dabie mountains is also caused by the high-intensity land development in this period.

3.2 1995 to 2004 county ecological pattern recovery began to highlight

As based on the standard commodity grain account in 1994 and 1997, "small town census register management system reform pilot program" issued and implemented, and the market economy of our country, after the reform and opening up coastal was intensified and jobs demand has risen sharply, in a relatively backward central and western provinces began to flow across provincial rural surplus labor, employment mount guard around the coastal development zone, realize long-distance migrant workers to increase income. During this period, the total number of migrant workers in Jinzhai County increased year by year. In 2004, the number of migrant workers reached 10 million, accounting for 00% of the total number. With the transformation of rural energy from firewood to coal and liquefied gas, farmers' demand for mountain firewood in Jinzhai County has dropped sharply. Since 1999, the land originally developed on hillsides in Jinzhai County has been transformed into woodland, with forest and grass vegetation recovering quickly and soil erosion damage intensity reduced. Therefore, the large-scale population migrant workers, the transformation of rural energy structure and the implementation of the national policy of returning farmland to forestry jointly promoted the ecological pattern recovery of Jinzhai County. In 2004, the land area of NDVI> accounted for 31.45% of the total area, and the ecological vegetation began to recover to the level of 1987.

3.3 2004 saw relatively stable county ecological pattern

With 2003 rural tax and fee reform and the abolition of agricultural taxes in 2006 a comprehensive, in 2004 on the opinions on some policies to promote farmers to increase income, such as the implementation of the policy, and the rise of nearly a decade of rural various production cooperatives and the rural land circulation, our country began to appear in the development of urban and rural areas as a whole pattern of jinzhai county agricultural production began to rely on scale,

intensification of mountain resources, ecology, high-tech direction development, gradually get rid of the extensive damage to the ecological environment of traditional agricultural land development path. On the one hand, farmers can not only work in cities to increase their wage income, but also to large farmers to increase their operating income; On the other hand, the land contracted by farmers can obtain the subsidy income through the circulation. This development path greatly reduces the damage to the rural ecological environment. The contradiction between people and land is not highly concentrated on expanding the scale of rural land development, but on increasing farmers' income through multiple channels. Therefore, the relatively stable ecological pattern of Jinzhai County began to emerge after 2004. In 2009, the land area of NDVI> accounted for 33.83% of the total area, reaching a relatively stable level.

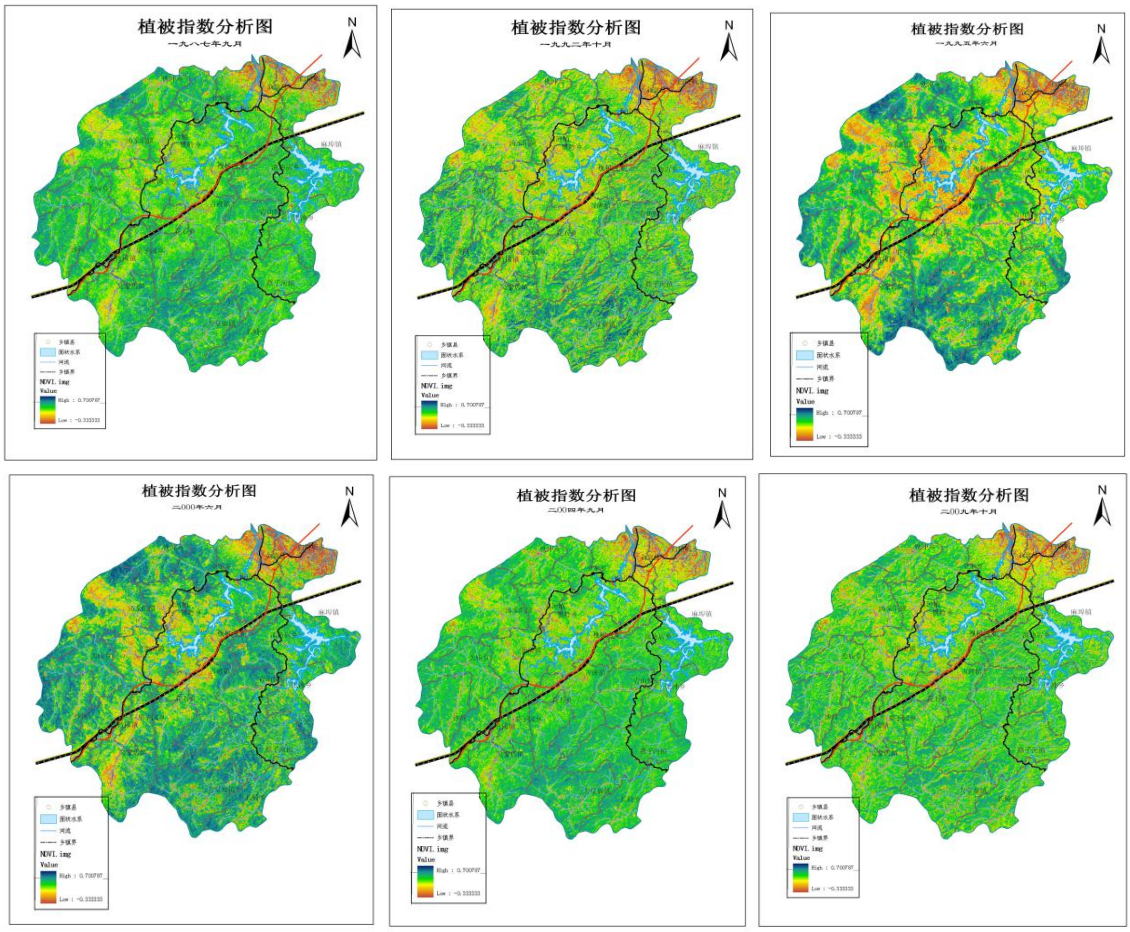

Figure 1. Time-space evolution map of NDVI in jinzhai county (1987~2009)

To sum up, population pressure is the dominant factor of the relationship between people and land in Jinzhai County, while economic and policy factors are the most direct driving force for the change of ecological pattern in Jinzhai County. In order to promote urbanization under the mode of ecological civilization development, it is necessary to objectively analyze its influencing factors, grasp the core factors affecting ecological pattern change, clarify the bearing capacity of ecological environment and guide the rational allocation of county population, industry and policy according to local conditions. Therefore, the spatial recognition of ecological pattern, especially the spatial recognition of urbanization, is a key prerequisite and foundation for county industrialization, urbanization and agricultural modernization under the mode of ecological civilization development.

4. Judged the ecological security pattern and urbanization spatial pattern of jinzhai county

This research area of jinzhai county aims to build a spatial pattern of urbanization that can not only satisfy the localized development but also support the ecological security pattern. In other

words, it aims to build a spatial pattern of urbanization based on the ecological security pattern and co-developing ecological security pattern and ecological economy pattern.

4.1 evaluation of natural geographical pattern

River system and vegetation distribution are the basic elements to maintain regional ecological spatial pattern, and also the core elements of ecological security pattern. In the process of promoting new industrialization, urbanization and agricultural modernization, we must respect the endowment law of the underlying elements of regional ecology and not destroy the original ecological texture to develop county economy. Therefore, the identification of the space of original ecological factors such as river system and vegetation distribution is the basis of the analysis and evaluation of ecological security pattern, and also the background of the spatial identification of urbanization under the mode of ecological civilization development.

4.2 Risk assessment of soil erosion

Soil erosion is an important factor affecting ecological security pattern and agricultural modernization under the mode of ecological civilization development. Soil erosion will not only affect the ecological environment quality and agricultural modernization in the county, but also affect the construction of ecological civilization in a larger river basin. Therefore, in the process of ecological civilization construction, the ecological space causing soil erosion must be identified, and vegetation cover must be given to curb soil erosion. The topographic slope of Jinzhai County is above 15 degrees, accounting for 43 percent of the county. According to the soil erosion sensitivity analysis data of dabie mountain area, the moderate and highly sensitive areas in jinzhai county account for 91.83% of the total land area of the county. This data fully shows the extremely high risk of soil erosion in Jinzhai County, causing nearly 200 million yuan of economic losses every year, ranking first in the Dabie Mountains.

4.3 Flood risk assessment

Flood inundation risk is one of the important factors influencing the ecological security pattern, and it will cause devastating disasters to the space of urbanization, the development of new industrialization and the construction of agricultural modernization. Therefore, the identification of flood inundation risk space is crucial to the construction of ecological civilization. The average annual precipitation in Jinzhai County is 1331.7 mm. The heavy rainfall and frequent rainstorms, together with the topographic features, make regional flood or mountain flood extremely easy. For example, the floods in 1954, 1969 and 1991 all caused serious social and economic losses to the local area. Based on DEM data, submergence simulation analysis of 120-240 meters elevation is performed. The range of submergence evolution of different elevation is shown in the figure below. The flood control design water level of meishan reservoir is 139 meters. When the water level reaches 140 meters, meishan town, yofang town, taoling town, huaishuwan town and mabu town are at high risk.

4.4 Prospect interpretation of ecological security pattern

Although there is great uncertainty in the change of ecological security pattern, the evolution mechanism and characteristics of ecological security pattern can be regulated through the analysis and evaluation of the factors affecting the ecological security pattern mentioned above. Based on the ecological carrying capacity and according to the objective demand of the future population, industry and urban development of jinzhai county, the overall strategic requirements and direction of the goal oriented ecological security pattern should be put forward. Therefore, under the existing ecological endowment framework of Jinzhai County, three levels of ecological security pattern evaluation criteria, namely basic, satisfactory and ideal, have been formulated in this study to meet the development needs of different regional positioning.

4.5 Baseline ecological security pattern

Bottom line pattern of ecological security is the most basic protection under the premise of the ecological environment, the greatest degree to the environment of development, to the use of ecological resources as much as possible, generally applies to soil erosion, flood risk smaller and smaller in the plains of regional competitiveness strong low mountain hilly area, core strategic significance in advancing the conditional area promoting the construction of new industrialization and urbanization, safeguard the basic bottom line of ecosystem services; The bottom line ecological security pattern service area scope is generally small. According to the control requirements of the baseline ecological security pattern, the ecological control area of Jinzhai County covers about 993 square kilometers.

4.6 Ideal ecological security pattern

The ideal ecological security pattern is to protect and cultivate the environment to the maximum extent under the premise of satisfying the basic life of urban and rural residents. In general, it is suitable for mountainous areas with large soil erosion, concentrated national ecological forest land, and greater regional ecological impact. The core strategic significance lies in the construction of ecological barrier function. Industrialization and urbanization should give way to the construction of ecological barrier function. The ideal ecological security pattern is the ecological baseline for maintaining a larger regional scale. According to the overall requirements of the ideal ecological security pattern, the ecological control area of Jinzhai County covers an area of 3,226 square kilometers.

4.7 Satisfy the ecological security pattern

Living in the middle of the ecological security pattern, we should not only keep the ecological bottom line, but also promote social and economic development. Generally applicable to zhongshan hilly area with various ecological risks but which can be precontrolled through engineering; The core strategic significance lies in paying equal attention to economic development and ecological conservation and promoting coordinated regional development. According to the control requirements of satisfying ecological security pattern, the ecological control area of jinzhai county covers 1961 square kilometers.

The meaning of each ecological security pattern, judgment criteria, adaptation to the region, and strategic significance (industrial development, urban construction, ecological services, etc.); what is the area of the three land in Jinzhai County.

The map was replaced by the one that we finally determined was divided into three types of land, the forbidden area, restricted area and suitable area.

5. Spatial identification analysis of urbanization under the mode of ecological civilization development

5.1 Comprehensive interpretation of ecological security pattern

The construction of ecological civilization is not a simple ecological and environmental project, but a systematic project integrating political construction, economic construction, social construction and cultural construction. Although jinzhai county has been identified as the dabieshan soil and water conservation ecological function area in the national main functional area planning, it is unrealistic that jinzhai county, as a county-level development subject, relies on the financial transfer payment of higher authorities. Therefore, Jinzhai County needs to develop moderately on the basis of the support of national poverty alleviation policies to support the economic transformation and upgrading of the county. According to the objective reality of development and poverty in jinzhai county, combined with the ecological resource advantage and red resource background, the prospect of ecological security pattern in jinzhai county can neither be the bottom line ecological security development pattern, nor can it be completely satisfied ecological security development pattern. The prospect of ecological security development pattern should be chosen according to the ecological background guidance and the overall requirement of mountain resources

development and protection. The author believes that the ecological protection area and tourism development zone represented by paradise village in the south central mountain area of Jinzhai County adopts the ideal ecological security pattern to protect the ecological environment and conserve ecological resources to the greatest extent. In the hilly region of the central part, a satisfactory ecological security pattern is adopted, and the densely populated areas can develop planting and manufacturing industries in mountainous areas, protect the ecological environment of the reservoir area, and develop in a balanced way on economic development and ecological conservation. In the northern plain area, the ecological security pattern of the bottom line is adopted to give play to the economic advantages in the location of Jinzhai County and the plain area where agriculture and industry are more developed, while ensuring that the bottom line is not damaged.

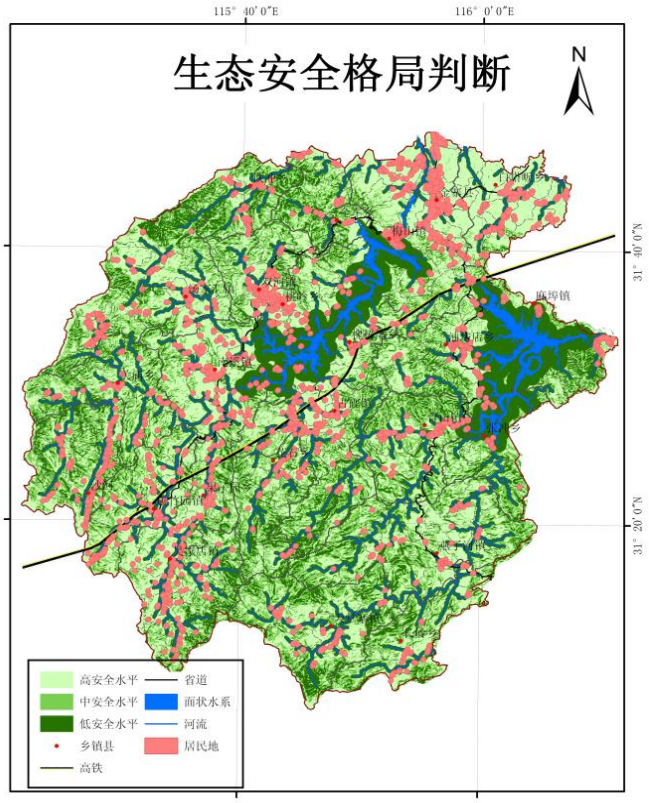

Figure 2. Judgment of ecological security pattern

5.2 Habitat suitability space evaluation

Residence safety is the basic premise to guarantee the construction of ecological civilization, and also one of the core elements to promote urbanization. In both urban and rural areas, the safety of habitat for ecological disasters should be the top priority. Therefore, habitat suitability evaluation is a prerequisite for spatial identification of county urbanization under the mode of ecological civilization development. From the perspective of habitability, the higher the risk of natural disaster, the less suitable for human habitation. The research area is defined as the following conditions for the suitability of residential land: Suitable living place refers to the area with flood inundation risk once in 50 years, the gradient is below 15 degrees, and it is located in the area of general prevention and control area of geological disasters. Restricted residence refers to the area and space within the sub-key prevention and control area of geological disasters, where the risk of flooding is once in 15 years, the slope is between 15 degrees and 25 degrees. Inappropriate residence refers to the geographical and spatial range of the key prevention and control area of geological disasters, where the flood inundation risk is once in five years, the gradient is above 25 degrees. Based on GIS spatial analysis model, the existing residential areas in Jinzhai County were evaluated for their livability. The results were as follows: 599 of the 1283 residential areas identified were habitable,

accounting for 46.7%.There were 446, or 34.8 per cent, which were essentially habitable. There were 238 unlivable, or 18.6 percent.

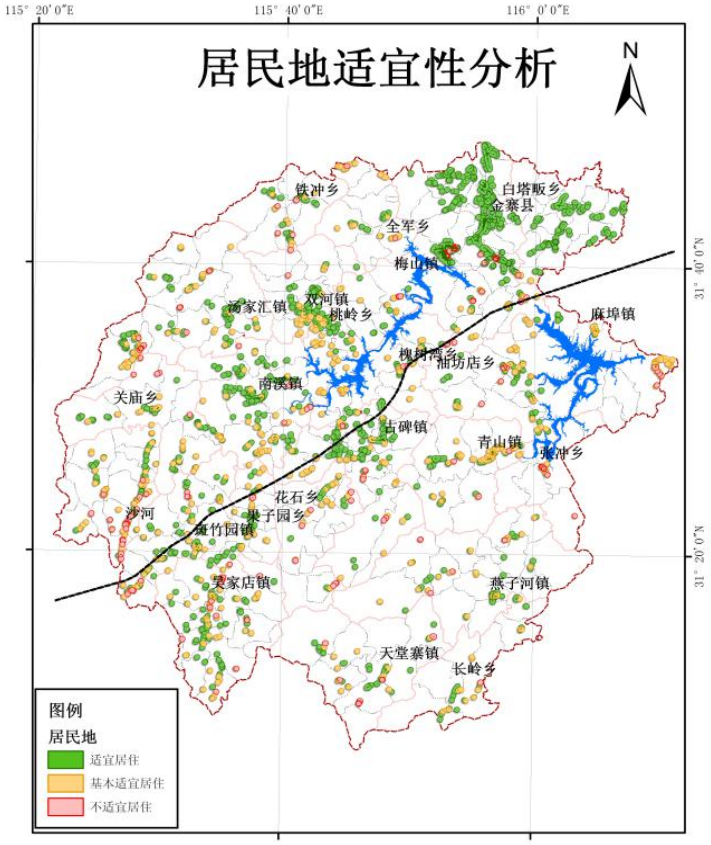

Figure 3. Analysis of the adaptability of the inhabitants

6. Conclusions and discussions

The promotion of urbanization under the mode of ecological civilization development must be carried out under the pattern of ecological security. County is the key area for the security of ecological security pattern in China. The promotion of county urbanization must fully demonstrate the basic situation of ecological security pattern. On the other hand, we should avoid unnecessary duplication of investment and waste of resources caused by national poverty alleviation policy funds. This paper selects Jinzhai County as the research area, mainly because Jinzhai County has important strategic significance in the national ecological civilization development model exploration process, and has important guiding significance for the future interpretation of China's ecological pattern. Through jinzhai NDVI index of "3 s" integration of spatial analysis, mainly reveals the process of the evolution of county ecological pattern and characteristics, the following conclusions: first, the relationship is the core factors influencing the ecological landscape, large-scale outdoor-workers lead to county resident population fell sharply, have a significant impact on the county economy development at the same time, also for the recovery of county ecological pattern played a major role; Secondly, the transformation of rural energy structure greatly reduces the possibility of farmers' damage to the mountain ecological environment. Third, the development of various types of rural production cooperatives and the expansion of rural land circulation have actively promoted the process of agricultural modernization. More importantly, it has changed the development pattern of traditional extensive agriculture that destroys ecological environment and actively promoted the relatively stable development of ecological pattern. Based on the analysis of the evolution mechanism and characteristics of the county ecological pattern in Jinzhai County, the important factors affecting the ecological security pattern, such as natural geographical pattern, soil erosion, flood flooding, economic structure and policy system, were

extracted, and the prospect of ecological security pattern was analyzed and evaluated. The author believes that the development model of ecological civilization is to make sustainable regulation in accordance with the law of social economic development and the law of contradictory development of people and land on the premise of respecting the pattern of ecological security, instead of only respecting the value orientation of pursuing development control based on ecology, but to realize county development in the process of management and control. Based on this understanding, the author believes that the spatial identification of urbanization must be based on the controllable ecological security pattern. According to different regulatory objectives, the ecological security pattern can build three different development modes: bottom line, satisfaction and ideal. The bottom line ecological security pattern is under the premise of protecting the most basic ecological environment, developing the environment to the greatest extent and making use of ecological resources as much as possible. It is generally adapted to plain, hilly and hilly areas with less soil erosion and less risk of flooding. The core significance is to develop economy. The ideal ecological security pattern is on the premise of satisfying the basic life of urban and rural residents. It protects and cultivates the environment to the greatest extent. It is generally adapted to the mountainous areas with large soil erosion and concentrated national ecological woodlands. The satisfactory ecological security pattern lies between the two. It is generally adapted to the hilly areas of zhongshan that have various ecological risks but can be precontrolled through engineering. The core significance lies in the development of both economy and ecological conservation. Then, the ecological security pattern analysis and evaluation method is applied to select the types of ecological security pattern in different regions according to the requirements of different development goals in the county region. On this basis, three types of urbanization space are identified, including forbidden area, restricted area and suitable area.

Acknowledgments

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