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The study and evaluation on the ecosystem recovery and reconstruction of the southern mountain areas of Ningxia based on the "3S" technology

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Key words: southern mountain areas of Ningxia, "3S" technology, ecosystem recovery, reconstruction, evaluation

Introduct The Southern Mountain Areas of Ningxia is located on the east of North-western part of china and also located on the upper reaches of Yellow River, which are covered by loess, uplands and ravines and Liupan Mountain is located in the middle of this region, with less precipitation and dry climate. It is the poorest area in China both in environment and economy because of the serious maladjusted man-land relationship, the lose of water and soil and the deteriorated ecosystem caused by the comparatively small capacity of original natural environment, weak ecosystem and huge population pressure.

In order to recover the ecology and promote the regional social economic development, the Chinese government launched the grand Ecosystem Recovery and Reconstruction Project in 1999—the Project of Returning Farmland to Forrest and Grassland.

Guided by the theory of ecology development, we set Pengyang county as an example to evaluate the Project of Returning Farmland to Forest and Grassland in the Southern Mountain Area of Ningxia based on the 3S" Technology. We chose the different TM satellite image of 2000, 2002 and 2005 in the same season, built the land use classified system and set up the judge symbol through the field practice of GPS positioning and survey, and got the changes of types of land utilization by using GIS software, DEM images overlay and grade classification. To evaluate the condition of the Project of Returning Farmland to Forest and Grassland in Pengyang county through these analysis.

Results The areas of Returning Farmland to Forest and Grassland is increasing from 2000 to 2005 in Pengyang county, and the returning slope Farmland reached 50239.029 hm^2, the forest and Grassland increased from 52570.228hm^2 in 2000 to 141598.499 hm^2 in 2005, and 38241.826 hm^2 barren areas become forest, the water area decreased 38.141 hm^2 and the living area is 91.632 hm^2. According to the changes of the land use types in 5 years, the Project in Pengyang county is in favorable condition within these five years.

Among the research areas, Farmland in every grade is decreasing, and the Farmland under 15° grade is also decreasing. The Farmland below 5° grade decreased 12192.687hm^2 with the change ratio of 28.525%; the Farmland between 5-8° decreased 4801.961hm^2 with the change ratio of 33.561%; the Farmland between 8-15° decreased 15887.362hm^2 with the change ratio of 51.758%; the Farmland between 15-25° decreased 13687.104hm^2 with the change ratio of 39.859%; the Farmland between 25-35° decreased 3791.725hm^2 with 65.276% change ratio, for those areas above 35° decreased 478.192hm^2 with 74.436% change ratio. These data shows that the Project of Returning Farmland to Forest and Grassland in Pengyang county has focused on the Farmland of above 15° grade, which measures up to national policy, ecology development, and the requirement of ecology recovery, and that is really very scientific. However, the Project in Pengyang county didn't distinguish the condition and grade of different lands, that means it returned most areas of Farmland below 15° grade to forest and Grassland.

With regard to the changes of the land use types in recent 5 years, the Project of Returning Farmland to Forest and Grassland in Penyang county is in a favorable condition. We combine planting in barren areas and returning Farmland to forest and grassland together to plant in a large scale. The newly increased forest and Grassland reached 89028.271 hm^2. Therefore, the resources of forest and Grassland increased, the structure of land use is getting more reasonable, and the eco-environment is improved, which has made great effects on the water and soil reservation, the self-restrain of water source, to stop the wind and fixation of sand, to make the improvement of environment as well as the promotion of the sustainable development of the complex system of regional nature, economy and society.