Dynamic Equilibrium of Local Social – Ecological
Systems Based on Land Cover

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Abstract: Interactions between social sub-system and natural sub-system are the core of studies on social-ecological systems（SES）. Interactions between social sub-system and natural sub – system of SES are at a dynamic equilibrium. In mountainous SESs which are agriculture-based and relatively closed   the dynamic equilibrium is attributed to natural vegetation successions and human disturbances on earth surfaces. It means that each patch of land in SES marks its position in a series from barren or artificial fields to the climax of natural vegetations. In other words   the dynamic equilibrium can be depicted from the general conditions of land use and cover（LUC）. Using data gained from LUC investigation and household socioeconomic survey   we developed a method for dynamic equilibrium analysis at village SES（V – SES）. The method could be applied to analyze the interactions between social sub-system and natural sub-system   and unveil the dynamic equilibrium status of V – SES. We took 3 villages with different altitudes on eastern slope of the Gaoligong Mountains（in Yunnang Proince of China） as cases to test the method. Results showed that DEI of 3 V – SESs ranked Hanlong village（ − 0.50）> Manggang village（ − 0.71）> Manghuang village（ − 0.75）. Hanlong village with lower population pressure and higher land productivity had the best dynamic equilibrium. Manggang village had the highest population pressure and higher land productivity   and Manghuang village had the lower population but lower land productivity. Both were in worse dynamic equilibrium status. Our study provided a new method to analyze dynamic equilibrium of V – SES. The results could also be a reference for studies of SES at a larger scale.

Key words: local social-ecological system; system dynamics; dynamic equilibrium; land use; the Gaoligong Mountains

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1 700 m;   1 000 m
          740 m   ;

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