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Spatial point pattern analysis on the villages in China's poverty-stricken areas

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Abstract

In 2011, there are more than 100 million poor people in China and they are mainly distributed in fourteen large poverty-stricken areas. China has been viewing the development-oriented poverty reduction work for the purpose of eliminating poverty as state-level strategic target, and the poverty reduction will play an important role in the new round of urbanization of China. To meet the requirement of "Entire-village Advancement" in *Outline for Development-oriented Poverty Reduction for China's Rural Areas (2011-2020)*, this paper first analyzes the spatial pattern variation characteristics of the villages with the change of distance in each poverty-stricken area by Ripley's K function and estimates the spatial pattern of villages in each county by Average Nearest Neighbor ratio. Then the relationships between poverty-stricken villages and their impact factors of DEM, water, railway and main-road are investigated. Results provide a good understanding of village's spatial pattern in different poverty-stricken areas and counties and relationships between village distribution and its impact factors, which provides an important decision basis for "Entire-village Advancement" in poverty reduction.

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Keywords: Spatial point pattern of villages; poverty-stricken area; China.

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1. Introduction

Since 1978 when China launched its reform and opening-up, China has developed its economy rapidly, and enhanced the people's living standard increasingly. Especially in 2010, China's GDP ranked second in the world; from then on, China entered a new historic stage of building well-off society in an all-around way. However, due to difference and restriction of regional development environment, the economic life in some poverty-stricken areas in the Central and Western China still develops slowly, and regional disparity, especially in rural-urban disparity, is widened increasingly (Li et al., 2014). For this reason, China has been viewing the development-oriented poverty reduction work for the purpose of eliminating poverty to realize common prosperity as state-level major strategic target. The poverty reduction will play an important role in realizing "China Dream" during the new round of urbanization (Bai et al., 2014). Through the implementation of *The Seven-Year Program to Help 80 Million People out of Poverty (1994-2000)* and *Outline for Development-oriented Poverty Reduction for China's Rural Areas (2001-2010),* the poverty reduction undertaking has scored tremendous achievements. China's absolutely poverty-stricken population dropped from 94.22 million in 2000 to 26.88 in 2010 (by the poverty standard of per capita net income 1274 yuan), and poverty incidence rate from 10.2% in 2000 to 2.8% in 2010 (The national bureau of statistics household survey office, 2012). Because of large number of poor people in China, relative poverty problem is serious, so the poverty-returning phenomenon happens occasionally and the development-oriented poverty reduction task shall be boosted further (Wang et al., 2014). *Outline for Development-oriented Poverty Reduction for China's Rural Areas (2011-2020)* issued in 2011 determines 680 counties in 14 contiguous poverty-stricken areas as major targets, and formulates accurate development-oriented poverty reduction work pattern of "Entire-village Advancement", which means that targeted measures should be taken to eliminate poor people village-by-village.

The 14 poverty-stricken areas involve wide territory and diversified landforms, so the spatial distribution characteristics of the villages in different areas are different. To implement the new development-oriented poverty reduction pattern of "Entire-village Advancement", specific measures should be made according to the characteristics of different regions (Wang, 2014). So understanding the spatial pattern and distribution of villages in poverty-stricken areas is an essential and fundamental task for "Entire-village Advancement". At present, it is macroscopically void of investigation and comparative analysis on spatial pattern of the villages in the 14 poverty-stricken areas (Wang et al., 2014). On the basis of the requirements of "Entire-village Advancement", through collecting the location data of 191,537 administrative villages in the 14 poverty-stricken areas, this paper adopts Ripley's K function (Ripley, 1977) to calculates the spatial pattern variation characteristics of the villages with the change of distance in each poverty-stricken area, employs Average Nearest Neighbor ratio (Ebdon, 1985) to estimate the spatial pattern of villages in each county, and compares their difference in different poverty-stricken areas, thus understanding the distribution pattern of the villages to provide macroscopic decision basis for the implementation of "Entire-village Advancement". Moreover, according to the natural factors (e.g., DEM (digital elevation model) and water) and social factors (e.g., railway and main-road), neighboring relations between the villages and all the factors are calculated, analysis and comparison on the impact of natural and social multidimensional factors on the poverty-stricken areas are performed, thus macroscopically knowing well about the relationships between villages and multidimensional impact factors to provide decision basis for spatial optimization and reorganization of the villages in the poverty-stricken areas (Liu et al., 2013), which is of vital practical significance to make overall arrangement of rural-urban development-oriented poverty reduction and boost new round of urbanization (Bai et al., 2014; Liu et al., 2010; Wang et al., 2014).

2. Data and Method

2.1. Description of study area and data

In 2011, CPAD (the state council leading group office of poverty alleviation and development) determines 14 contiguous poverty-stricken area (Fig. 1), including Wumeng Mountain area, Liupan Mountain area, south Xinjiang area, Lvliang Mountain area, Tibetan ethnic area in Sichuan, Yunnan, Gansu and Qinghai provinces, south area of Great Khingan Mountains, Dabie Mountain area, Wuling Mountain area, border area in western Yunnan, rocky