

The Socio-Economic Transformation of Rocky Karst Areas: Case Study of Qianxinan Prefecture, Guizhou Province, China

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Abstract

The physical and economic conditions of the karst mountain areas of the Qianxinan Prefecture of Guizhou province of China are the reflection of a negative triangular relationship involving the poor peasantry, unabated population growth, and impoverished fragile lands. For survival, the peasants had opened up large areas of mountain slopes that led to the sharp decline in forest cover and consequent exposure of bare surfaces to soil erosion. Through field investigations, this study demonstrates that government investments of funds and manpower in Qianxinan Prefecture have achieved positive results in checking population growth, enhancing the quality of life and creating economic opportunities in the use of local natural resources. This process includes measures undertaken in livestock raising, cultivation of prickly-ash¹ and the resettlement of poor peasants. However, the carrying capacity of the karstified mountain areas is severely limited. Thus, how poor peasants deal with their future in the typical ecologically fragile region of Qianxinan Prefecture is the focus of this study. It is found that the promotion of urbanization is the key approach to the economic transformation and agricultural modernization of the area under study.

Key words: Qianxinan Prefecture, karst mountain areas, peasantry, environmental protection, economic transition, urbanization

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Introduction

In the Qianxinan karst areas, peasants have traditionally worked on impoverished soils to eke out a living. This condition has become a classic case of the “poverty, population, and environment (PPE) vicious circle”.² In order to survive, poor peasants, ignorant of environmental problems, have over-exploited available natural resources and brought about environmental degradation.

Before the 1980s when the policy of “producing grains as the key principle” was practised, peasants cleared and cultivated large areas of hill slopes. The result was the exposure of rocky soils and an increase in soil erosion. Today, Guizhou’s traditional agricultural pattern has to face such challenges as environmental protection and rehabilitation, and the exploitation of natural resources to support a viable livelihood on an economically sustainable basis. Success in achieving these results would enable the local inhabitants to prosper by living in harmony with nature.

This paper is a case study of the rocky karst areas in Qianxinan Prefecture of Guizhou. Situated in eastern region of the Yunnan-Guizhou plateau of southwest China, Guizhou province occupies an area of 176,000 km². Being mountainous and lacking in accessibility, the province has remained as one of the poorest in the country. This study of the Qianxinan Prefecture is based on field investigations, interviews, discussions and consultations with officials of the Development and Reform Committees in the prefecture. The discussion is divided into three sections: the first is an analysis of the current situation of the karst areas in Qianxinan Prefecture; the second section examines the results of the poverty alleviation efforts and the implementation and practice of ecological management. The final section is the focal point of the study and argues that the carrying capacity of the karst areas is limited and that most of the peasant population will ultimately move to the cities.

The latest United Nations estimate places the urban population of China in 2014 at about 758 million, or about 54 per cent of the total population. By 2050, these figures would reach 1.05 billion or 76 per cent (United Nations, 2014). Between now and 2050, the question of how to help the peasants living in the ecologically fragile areas of Qianxinan to restructure the economy, through efforts to modernize agricultural production and to become more industrialized and urbanized, deserves serious considerations so as to find the best solutions to settle the problems of the peasants.

Present Status of the Ecologically Fragile Areas in Qianxinan Prefecture

The karst area of Guizhou is the largest in southwest China and covers an area of 32,476 km² or 31 per cent of the southwest karst region. Heavily karstified areas make up 16.2 per cent (5,250 km²) of the total, while the moderately and lightly karstified areas cover 36.6 per cent (11,896 km²) and 47.2 per cent (15,331 km²) respectively. Overall, the area of serious karst

formation is relatively small and accounts for 17 per cent of the prefecture (Department of Land and Resources of Guizhou Province, 2014).

Substantial numbers of Han migrants moved into the karst areas from the mid-nineteenth century to open mines and cultivate drought-resistant crops such as corn, potatoes and sweet potatoes on slopes. Field studies indicate that cultivated areas on slopes exceeding 25 degrees where soil erosion is most serious are likely to be the most badly karstified. This situation deteriorated after the 1949 revolution when population increased rapidly (程安云等/Cheng Anyun *et al.*, 2010).

The Qianxinan Prefecture is situated in the southwestern part of Guizhou Province in a highly karst and heavily desertified upland area. The prefecture occupies an area of about 16,800 km², of which 60 per cent is covered by surface karsts and 30 per cent by broken rocks. The terrain declines in altitude from west to east with the highest point reaching a height of 2,207m. Uplands occupy 62.8 per cent of the province. Four-fifths of these uplands are rugged and deeply dissected, among which 60 per cent are characterized by valleys between 300m and 500m deep, and the remaining 20 per cent as much as 500-700m. Additionally, an estimated 12.6 per cent of the province is exposed to the process of rocky desertification. This process is likely to intensify if effective management measures are not put in place (Development and Reform Committee, Qianxinan Prefecture, 2014). The key factors that have led to this process of rocky desertification and ecological degeneration in the Qianxinan Prefecture include the socio-economic activities of the population, over-population, and the removal of vegetation cover and accelerated soil erosion. These negative effects are discussed as follows.

Human Factor

Table 1 shows that Guizhou's population increased by 2.3 times from 15.04 million in 1953 to 34.75 million in 2010. Despite the steady increase in the rate of urbanization, the rural sector still accounts for 23 million or 66.2 per cent of the total population. On the basis of available arable land, Guizhou is the most heavily over-populated province in China. In 1998, the average per capita cultivated land area was 500m², having declined sharply to 38.5 per cent of the level in 1961 (程安云等/Cheng Anyun *et al.*, 2010).

Southwest Guizhou is no exception to the general situation. In 2010, its total urban area of 16,804 km² accommodated a population of 3.376 million, or a population density of 201 per km². Given the mountainous terrain and scarce arable land supporting 86.5 per cent of the population, the high density in rural areas is inevitable. Although natural population growth has been put under effective control, 367,000 persons or 11.14 per cent of the population still live in poverty. Per capita income in 2010 was RMB3,095, in part due to the fact that the primary sector contributed to only 22.8 per cent of GDP (Development and Reform Committee, Qianxinan Prefecture, 2011). This is a clear indication that the sector is disadvantaged by its low value-added products and low efficiency.

The high rural population density of Guizhou has a direct correlation with the province's state of ecological degradation. Consequently, high rural density coupled with heavy reliance on food supply from fragile lands has reduced considerably the forest cover to produce a desolate and barren landscape. By adopting a form of development that actually “plunders” limited arable land resources, peasants are basically ignorant of the carrying capacity of the land (兰安军等/Lan Anjun *et al.*, 2003). The practice of over-intensive cultivation on thin top soils with almost no maintenance measures greatly accelerates water seepage and soil erosion. This results in the exposure of bare rocks and the occurrence of the desertification process accompanied by worsening of soil erosion.

Table 1. Changes in Guizhou's Urban Population, 1953-2010

Census Year	Total Population (1,000)	Annual Growth Rate of Population (%)	Urban Population (1,000)	Proportion of Urban Population (%)	Proportion of Illiteracy Rate in Population (%)
1953	15,037.3	-	1,099.1	7.31	-
1964	17,140.5	1.32	2,035.5	11.88	-
1982	28,552.9	2.89	5,042.2	18.92	42.11
1990	32,391.1	1.59	6,231.7	19.24	29.92
2000	35,347.7	0.82	8,445.1	23.96	16.98
2010	34,746.5	-0.41	11,747.8	33.81	8.74

Source: 中国统计局/China Bureau of Statistics, 2014

Fragile Karst Natural Environment

Most of Guizhou's karst areas comprise a fused layer of contiguous limestones and dolomites that are fragile and are easily vulnerable to rocky desertification. In certain areas, the rate of soil formation is lower than that of soil erosion, and is 10 to 80 times lower than that of non-karst areas. Over time, top soils are washed away to expose bedrocks on the surface. Steep karst slopes and outcrops are widely scattered throughout the province. The steeper the slopes and taller the hills, the less stable the slopes and their surface materials. With the removal of the thin layer of top soils and their nutrients, the consequence is the common occurrence of desert-like features.

Another natural factor is climate. Guizhou is affected by the circular air masses brought by the sub-tropical monsoon winds during most parts of the year. It is warm and humid with an annual rainfall of 1,000-1,200mm. Thus, high temperatures and abundant rainfall, with frequent rainstorms, accelerate the process of surface erosion of the karst areas (王敬贵等/Wang Jinggui *et al.*, 2014).

Conditions of Agricultural Production

As the education level of southwest Guizhou population is generally low, the majority of the farmers rely on traditional labour-intensive methods of small-scale production that are low

in efficiency and yield. While better quality farms are found in the intramontane basins, valleys and depressions, over half of all farmlands are located on slopes and in rock recesses and grit lands that may be categorized as land with thin, low-grade soil of low fertility. Of all the farmlands, 75.8 per cent are dryland, 23.7 per cent are wetland and 0.5 per cent irrigated land. Horticultural farms account for 6.9 per cent of the dryland devoted largely to the cultivation of sub-tropical products such as peaches, loquats and tea.

Large numbers of peasants who are engaged in farming on fragile karst land endure low levels of productivity in the midst of continuous population growth. These adverse conditions have considerably hampered further economic progress of the Southwest region. As a consequence, peasants suffer from limited capital accumulation and are able only to engage in small-scale processing of agricultural products that add little value to the local economy. The weak agricultural economy of the region is the result of a vicious circle that leads to the entrenchment of poverty and the degradation of the natural environment (Development and Reform Committee, Qianxinan Prefecture, 2011). Since the 1990s, the central, provincial and local governments have made unremitting efforts to mitigate the effects of the karst landscape and to better manage the ecological system.

Integrated Management Strategy of Karst Areas

Management Measures and Results

The basic principle of the Qianxinan Prefecture government in managing karst areas is to tighten the links between the managing process and socio-economic development. The aim is to enable peasants to break away from poverty by restoring the vegetation cover of karst areas with sustainable protective measures. These measures include reverting farmlands to forest cover, prohibiting upland cultivation in favour of planting trees, raising pastures for livestock grazing, and preservation of water and land resources. Displaced peasants would be shifted to other appropriate areas. Ecological management of karst areas would involve the need for population control, and reverting farmlands to forests and pastures.

Population Control

Migration and Poverty Alleviation

Poverty alleviation measures by shifting peasants out of impoverished and backward areas play a key role in facilitating the economic transition towards industrialization, urbanization and agricultural modernization. This strategy has brought about dramatic changes after the year 2000 in the most serious karstified areas of Qianxinan where peasants traditionally practise ecologically unsustainable agriculture. Under the guidance of the Ecological Migration Team of Qianxinan Prefecture, a total of 40 resettlement sites and new townships have been established to accommodate more than 36,000 people in 2012-2014. The resettled peasants enjoy

welfare benefits that are similar to those of local residents. These benefits include education, health care, retirement insurance, unemployment benefits, social welfare and assistance.

Guizhou's province-wide ecological migration programme plans to resettle two million people between 2012 and 2020. Of these, 168,670 people in the Qianxinan Prefecture have been targeted for resettlement, or about 8.4 per cent of the provincial total. The success of the entire programme will be decided by the formulation of effective measures in terms of managing and implementing the residence status of migrants, their housing, employment, education, land management, social security, financial management as well as the strengthening of the follow-up assistance to sustain the development process (Guizhou People's Government, 2012).

Reverting Farmlands to Pastureland for Livestock Raising

Raising livestock is a workable option in karstified areas. Qinglong county has been selected for grazing on a trial basis. Its upland monsoon climate that is cool and humid is found to be suitable for the development of good grazing land. Currently, 14,000 households in the Qianxinan region are engaged in developing 450,000 mu^3 of forage grassland and 205,000 mu of improved grazing fields to support 450,000 heads of sheep. A village called Erdaopo is one of the 92 villages where pilot projects are being tried out to convert farmland into pastures. Since 2001, this village has discontinued the cultivation of corn to raise sheep on its former farmland in an ecologically sustainable manner. The "Boer" sheep that has been brought in has adapted well to the local natural environment.

The "Qinglong Model" of sheep raising has served as a viable alternative to the traditional but ecologically unsustainable mode of farming. The success of this new model is significant in four aspects:

- Environmental protection: Grasses reduce soil erosion and water runoff, and at the same time increase the organic content of the soil. Significantly, the steeper the slopes, the greater the amount of soil and water retention;
- Labour saving: Labour input is reduced considerably to contribute directly to an increase in average productivity;
- Economic benefits: Significantly enhanced through an increase in efficiency; and
- Skill and knowledge enrichment: During the transition from food crop planting to sheep raising, peasants undergo different levels of skill training to gain new knowledge and skills.

Another successful example is the "Tingtang Model" in a heavily karstified area in northeastern Zhenfeng county. Two villages, Yingdongwang and Chaeryan, situated on the southern bank of the Beipan River have a respective population of 2,470 in 820 households in 2012. Farmlands are situated on steep karst terrain lacking in water. Cultivation of corn on shallow and infertile soils has traditionally given poor yields (朱明辉/Zhu Minghui, 2012). Instead, the prickly-ash is found to grow well here. Its successful cultivation has offered a viable alternative to bring change and improvement to the life of the villagers.

Ecological Management and Implementation Outcome: An Assessment

Overall Performance

The current emphasis on proper ecological management by the central, provincial and local governments has helped to arrest the trend of environmental degradation in Qianxinan Prefecture. The two development models cited above have brought benefits to peasants as well as success in tying up ecological protection with economic activities to form a mutually dependent and reinforcing system. This system ensures that land is utilized according to its optimal bearing capacity.

Giving due consideration to the importance of environmental protection, Qianxinan Prefecture has, since 2005, developed over 30 grazing fields, each measuring more than 1,000 *mu*. Protective measures have brought about a decline in the extent of karstified areas, an increase in forest and bush cover, in water storage capacity, and a reduction in the occurrence of flash floods and mudslides.

To consolidate improved economic benefits, project areas are reafforested with plants of high economic value as well as other trees for purposes of environmental protection. Both types of forests will in time yield timber and wood as an additional source of income. The key principle in the protective use of the environment is to respect the rules of nature by adopting the most appropriate approach to suit local conditions. This will allow the adoption of the best land use options for optimal effect.

The Control of Rocky Desertification in Qianxinan Prefecture

Research done by the Institute of South China Karst of Guizhou Normal University which applied Markov Modelling for future projections shows that, by 2020, the expansion of rocky karst areas could be arrested if the current anti-degradation measures continued to be implemented (Development and Reform Committee, Qianxinan Prefecture, 2011). It is possible to increase the area of land that is free of rocky karstification in Qianxinan Prefecture by 12.8 per cent between 2010 and 2020. Similarly, moderately and heavily karstified areas could decline by 11 per cent while the extremely karstified areas could decrease by 17.2 per cent (Table 2).

Table 2. Future Trend of Rocky Karstification of Qianxinan Prefecture, 2010-2020

Extent of Rocky Desertification	2010 (Ha)	2015 (Ha)	2020 (Ha)	Projected Change during 2010-2020(%)
Free	3,173.15	3,382.71	3,580.15	12.83
Potentially vulnerable	2,349.09	2,348.55	2,373.38	1.03
Light degree	2,149.70	2,101.55	2,024.40	-5.83
Medium degree	1,590.12	1,500.88	1,411.01	-11.26
Heavy degree	751.94	702.72	662.43	-11.90
Extreme degree	235.20	212.83	194.87	-17.15
Total	10,249.21	10,249.21	10,249.21	-

Source: Development and Reform Committee, Qianxinan Prefecture, 2011

The Development and Reform Committee of Qianxinan Prefecture has similarly formulated a short-term comprehensive plan for 2010-2020 to reafforest uplands and forbid farming, establish protective and economic forests, create pastureland, and implement ecological migration of affected farmers. In the process, however, various problems have emerged. These include the following:

- a) Administrative incompetence among certain county officials and the lack of inter-departmental co-ordination;
- b) The lack of funding is commonly voiced either for individual projects or planned packages in the implementation of anti-karstification programmes (Development and Reform Committee, Qianxinan Prefecture, 2014);
- c) Migrants are generally poorly educated, and have limited savings. They lack capital and skills to run their own businesses in the townships. Many are not able to find employment in the industrial parks or in the service sector (Anti-Poverty Ecological Migration Project Office, Qianxinan Prefecture, 2014);
- d) Rocky karstified areas of varying sizes are scattered throughout Qianxinan Prefecture as well as in Guizhou Province. Managing these areas is costly as it poses serious practical problems (Development and Reform Committee, Qianxinan Prefecture, 2011);
- e) The reversion of farmlands to forests and pastures has led to a significant shrinkage of available agricultural land. How to turn farmers who are used to inefficient and labour-intensive methods into more modern and efficient ones is a challenge to administrators.

Hence, in charting the economic transformation of ecologically fragile areas, it is important to consider the future direction of the process of urbanizing the farmers.

Rural Urbanization and the Economic Transition of Ecologically Fragile Areas

To harness sustainably the fragile environment, the people have to submit to nature by reverting agricultural land to forest and grass covers. To prepare for the future, it is essential that farming and animal husbandry keep up with modern demands and adopt mechanized operation and increase the scale of production. In rocky karstified areas, even if farmers intensify farming and animal husbandry and practise mechanized operations to raise productivity and modernize their production, the carrying capacity of agriculture will ultimately decline. To utilize karstified areas effectively, it is necessary to refrain from over-exploitation of land and water resources and to use chemical fertilizers judiciously to avoid soil and water pollution.

It is estimated that, in the next 30 years, the majority of Guizhou's population including that of Qianxinan Prefecture will live in urban areas while the rural population will decline substantially. Table 1 cited earlier shows the fast changing urban population in Guizhou over the past 50 years. The province's urban population rose from 7.3 per cent in 1953 to 33.8 per cent in 2010. In real terms, urban population had increased by 10.7 times, from 1.1 million to

11.75 million during the same period. More significantly, Guizhou experienced negative population growth between 2000 and 2010, yet it registered a 10 per cent increase in urban growth. This trend indicates that the most likely direction of population movements in Guizhou would involve urban development driven by internal and external mechanisms of the urbanization process. The components of this process may be termed “endogenous” and “exogenous” urbanization.

Endogenous urbanization is a process of *in situ* urban development which assumes two basic modes. The first mode is the progressive conversion of agricultural land at the fringe of urban areas into urban use. This process of rural urbanization is induced by the spatial expansion of cities which pushes up land values of adjacent agricultural land and its eventual transformation into urban quarters (李穗农/Li Huinong and 白中科/Bai Zhongke, 2014; 黄勇等/Huang Yong *et al.*, 2014). The second mode is that of small to medium-scale urbanization which develops according to local circumstances, resource potentials and developmental needs. This form of *in situ* urbanization takes place normally in remote rural areas. It is often associated with rural poverty alleviation through agricultural industrialization, rural tourism and the re-location of peasants into new townships (柴洪辉等/Chai Honghui *et al.*, 2009; 高福平/Gao Fuping, 2014; 何慧丽/He Huili, 2014; 尚海洋/Shang Haiyang, 2014; 王林梅/Wang Linmei and 邓玲/Deng Ling, 2014).

Some scholars such as Zhu Yu and his co-workers (Zhu *et al.*, 2013) and Cui and Ma (1999), in their studies of the urbanization of high-density villages on the coastal areas of Fujian, Pearl River Delta and Yangtze Delta, have observed the emergence of a spontaneous “bottom-up” phenomenon. This phenomenon is found to be the outcome of domestic and overseas investments, wider circulation of market capital and incentive-driven state policy following the economic reforms initiated in the 1980s.

The discussion that follows focuses on the second mode of urbanization in the context of the situation in Qianxinan Prefecture. The notion of rural urbanization was closely associated with the idea of “leaving the land without leaving the village” policy initiated during the early phase of economic reforms in China. It was then perceived as a “rational option” to absorb the surplus labour of poorly educated and unskilled peasants in the small towns close to their villages. This was also thought to have allowed the farm population to move progressively towards a modern urban lifestyle in qualitative and quantitative terms, and to participate in industrial development by contributing their low technical skills and cheap labour.

With regards to the strategy on the development of small towns, the “Planning Programme for Guizhou’s Small and Medium-sized Urban System, 2011-2030” refers to development with “Guizhou characteristics”. The strategy is to take the small towns as basic units and the small and medium-sized cities as the core to enable them to develop by promoting close linkages with major cities. Spatially speaking, the small and medium-sized cities should capitalize fully on low hilly areas and gentle slopes with good access to water resources to develop new settlements and industries. Furthermore, these settlements will need to highlight their local

ethnic features, and place emphasis on cultural development and ecological preservation. In building new townships in mountainous areas, the plan foresees that natural landscape encompassing hills and rivers, farms as well as villages and towns or cities will be combined to form an integrated entity (龙海波/Long Haibo, 2014).

Theoretically speaking, this planning concept and spatial organization are rational and realistic. But if too much emphasis is placed on the interplay and interactions of townships and industrial parks, hoping that peasants will switch to non-agricultural activities, the results might not compensate for the efforts and work involved. After World War Two, many developing countries have tried such a strategy but have achieved little success.

The current push towards urbanization includes enticing peasants to put down roots in resource-based small and medium-sized cities. Resource-based urbanization relies on mining, forestry and processing of raw materials, or by developing eco-tourism. Mining is subjected to resource depletion and mining towns will degenerate into “ghost towns” when mining operation ceases. Even at periods of peak production, the mining industry should shift to automated operation. This will in turn frustrate not only efforts to provide employment but also limit opportunities for the emergence of alternative industries when mining is eventually phased out (高福平/Gao Fuping, 2014). Besides, the recent expansion of highways and high-speed railroads to Southwest China will work against the growth of resource-based towns into major cities. While small mountainous townships relying on animal husbandry or the cultivation of prickly-ash may generate additional incomes through processing of raw products, their potentials for expanding the population carrying capacity of the local area or to generate substantial agglomeration effects are limited.

Exogenous urbanization relies largely on the advantages that large cities enjoy through foreign investments, their global linkages and the high value-added economic activities to attract small-town residents and peasants. Large prosperous cities notably those on the coastal areas act as a centripetal force attracting peasant-migrants and people from smaller towns. Rural urbanization is not the only mode of development open to the peasantry. More than 30 years of reforms have proven that only a small proportion of peasants have been absorbed into rural townships. The majority have in fact leapfrogged over the rural urbanization stage by taking advantage of opportunities for employment and higher income by moving directly into large cities within or outside their own province (Henderson, 2002).

Operating under a market economy, large cities are able to increase their impacts through the economies of scale. The major cities attract both “upper circuit” personnel with sophisticated skills and expertise and “lower circuit” individuals with little or no skills. The concentration of both social groups is likely to polarize the urban labour force. To the low-income groups, migrating to the cities as a means of raising their income and occupational status is a rational approach to transforming the labour force (Saksen, 2001; Wong, 2011).

China’s urban-industrial development after the advent of reforms is different from that in Western Europe of the late nineteenth century where relatively low productivity hampered the

expansion of the tertiary sector. Since the 1980s, industrial expansion in major Chinese cities in the Special Economic Zones and others that were endowed with competitive advantage has accelerated through the import of high-end technology and automation devices in their manufacturing processes. Through the infusion of professional expertise, a more sophisticated division of labour, information updating aided by fast and intensive interactions of technology at the global level as well as lower costs of transportation and labour, China has rapidly turned herself into the factory of the world. Driven by the economies of scale and multiplier effects derived from its modernized industries and businesses, major Chinese cities equipped with modern infrastructure have also benefited from cost-efficiency arising from their lower per capita cost relative to their high population densities and usage. This is further assisted by rising general affluence and domestic consumption which offer peasants from the countryside substantial job opportunities in the cities (Canina *et al.*, 2005; Glaeser and Gottlieb, 2009). All in all, the massive government-led urban renewal of inner city areas and the urbanization campaigns to expand city sizes have created numerous job opportunities for peasants in the construction industry and infrastructure sector.

Like the rural-urban drift which occurred in Western Europe in the wake of the Industrial Revolution, the present urban-bound exodus of peasants is a one-way traffic. Du Shuangyan's (2014) study on Guizhou's "floating" population has revealed some interesting facts. As of March 2013, there were 8.58 million migrant workers in Guizhou, of whom over 70 per cent had moved out of the province. About 97 per cent of the latter category moved into the provinces of Zhejiang, Guangdong and Fujian. Despite their generally low education background, out-migration from Guizhou has been persistently on the rise. Given their low social and educational status, they were mostly concentrated in environmentally inferior areas or places where job competition was less intense. Conversely, during the same period, migrant inflows from other provinces to Guizhou made up only 9.8 per cent of its total volume of outflow. These in-migrants were mainly concentrated in Guizhou's two major cities of Guiyang and Zunyi. Similarly, these two cities absorbed predominant numbers of migrants from other counties of Guizhou with Guiyang accounting for 48 per cent and Zunyi 21 per cent of the total. Du (2014) has made another important observation that recent mobility of Guizhou's "floating" population to major cities which enjoy agglomeration advantages has not only intensified in scale but also in the migration of family members. Migrant workers who bring in their families will aspire to stay in other provinces permanently.

These findings match those of Huang Yong and his research team in their study of the living conditions and aspirations of migrant workers in Zhejiang (黄勇等/Huang Yong *et al.*, 2014). They found that 23.99 million or 43.6 per cent of the permanent residents of Zhejiang in 2013 were agricultural migrant workers from within and outside the province. Yet, only half of these migrant workers living in cities had acquired permanent residence status. Four out of five surveyed in the study did not possess any technical skills but had relatively stable jobs in the cities. Among the problems that they encountered, the most serious ones were high living costs,

low wages, costly medical fees and rental, long hours of work and difficulties in registering their children in childcare centres and schools. Probably due to these factors, 28 per cent particularly those who were earning low wages, expressed their intention to return to their villages of origin for good. One may surmise that, besides feeling nostalgic and their wish to be taken care of by relatives in their old age, the main consideration is financial as they have little savings and are not entitled to local welfare benefits. Once granted residence status in the cities and able to enjoy similar social welfare and security as local urban residents, the peasant workers are most likely to put down roots in the cities.

Discussion and Conclusions

This case study shows that the investment of substantial capital and manpower coupled with the implementation of protective measures in fragile karstified areas in Qianxinan has succeeded in improving the livelihood of the peasants. The path to a better future of the peasantry lies in promoting the development of a green economy (廖洪泉/Liao Hongquan and 李朝远/Li Chaoyuan, 2014). Such an economy can protect not only the ecology but also help restore the distinctive features of the natural environment. It will also promote the harmonious coexistence between humans and nature and achieve sustainable development in accordance with the natural conditions of the environment. Although the fragile karstified areas are able to yield certain amounts of materials and energy substance on a sustainable basis, the extent that this can be done is understandably limited in scale and in scope.

Specifically, the problems facing the mountainous areas of Guizhou are typical of the *sannong*⁴ issues that are found throughout rural China that are characterized by high population densities in a subsistence economy. In the near future, population densities in areas that have reverted to forests and pastures would still be very high. Given China's social system and the nature of its collectively owned rural land, one cannot imagine that its rural transformation would follow that of Germany and France after World War Two where agricultural land began to amalgamate into the hands of fewer farmers who adopted modern methods to run their enlarged farmland. In 1967, in his book entitled *The End of the Peasants*, Henri Mendras discussed the disappearance of the traditional peasants in France in the midst of its post-war economic transition. In the face of high rates of economic growth and rapid advancement of industrialization, French peasants either disposed of their small land parcels or became shareholders of rural cooperatives. Some adopted mechanized farming while others migrated to the cities (孟德拉斯/Mendras, 2005).

From China's perspective, peasant agriculture will continue to play its dominant role. Schumacher (1973) initiated a "small is beautiful" concept in the 1970s where he praised the integration of peasantry with nature. He advocated the use of human-friendly or intermediate techniques and the recycling of farm materials that would contribute to the protection of the environment. He advocated self-reliance and local consumption in favour of the marketing

of farm produce (Schumacher, 1973). The Schumacher concept is not easily adaptable to the densely populated rural areas of China. Under the present rural policy in China, peasants are encouraged to upgrade their farm operations and at the same time protect the physical environment in order to improve and modernize their living standards substantially.

Within the next 20 to 30 years, it is foreseeable that Chinese peasants will emerge anew from large-scale and centralized agricultural production activities that will help to dismantle the persistent vicious cycle of poverty. The vision of the new rural villages should be one of low population density and improved quality of life capable of evolving into an environmentally sustainable habitat in harmony with its economic activities. At the same time, the new farmer will have access to the latest information, be imbued with the spirit of the market enterprise, and environmentally responsible in his production and consumption (何慧丽/He Huili, 2014; Rosenthal and Strange, 2003). As to how to achieve a more socially just and sustainable development, the crux is to undertake legal measures to avoid over-concentration of agricultural property rights in the hands of a few persons.

After more than two decades of economic reforms, the year 2006 marked a watershed in rural-urban relationship. China has since reversed its pre-reform model by which the cities were supported by rural villages to the current practice of cities supporting the villages. Similar to the practice of advanced Western countries in the post-World War Two period, the Chinese government in 2006 put forward its historic nine-point announcement on measures to help peasants. Henceforth, the government would implement the following measures: a) more aid provisions for agricultural and village developments; b) reduce or waive agricultural taxes; c) seed subsidies for those growing staple food crops, and direct subsidies for acquisition of farm machinery and tools; d) improvement of rural infrastructure and public facilities; e) rectification and standardization of the agricultural capital market; f) strengthening of compulsory education in rural areas; g) emphasis on rural health care and services; h) increase efforts in poverty reduction among the impoverished and to help them with projects to increase their earnings; and i) helping peasants to diversify their sources of income. All these measures are strongly associated with the objectives to promote the use of technology to facilitate multi-functional farm operations, and to evolve an efficient modern agricultural structure and a highly effective marketing system (百度文库/Baidu Archives, 2014).

That large numbers of peasants in Guizhou have moved into cities points to a trend that is irreversible. Releasing excess rural labour to serve the non-agricultural sectors has produced two benefits. The first is to enable peasants remaining in mountainous areas to raise average per capita income, and the other is to release excess labour to meet the demand for workers in the urban sectors. Even though many migrant workers have yet to obtain permanent residence status in the cities, their contributions to urban development in “3D occupations” (dirty, dangerous and difficult) is undeniable. It is important that the issue of peasant workers be handled with care. Ultimately, migrant workers must be able to earn a decent living in the cities,

improve their employability, and enjoy similar welfare benefits as urban residents, and that their children have access to education in the cities.

The fundamental issue in helping the poor out of poverty is urbanizing the people. At the end of 2012, 380 townships and 2,330 administrative villages of Guizhou province had completed their renewal plans. The trend towards urbanization is inevitable. Nevertheless, some officials have been adamant in accelerating the urbanization process and are over-optimistic in their belief that it will place Guizhou on the “express track” of development and that the *sannong* problem will be resolved. They also believe that urbanization would help to speed up development of economic sectors in which Guizhou possesses special advantages and hence to see the emergence of strategic burgeoning industries and expansion of the production chain. It is argued that all these factors would act as an engine in stimulating local socio-economic development (肖克/Xiao Ke and 刘久锋/Liu Jiufeng, 2013; 王璐瑶等/Wang Luyao *et al.*, 2010).

Arguably, not all regions or counties are suitable for the establishment of large new towns or industrial parks. However, whenever the central government introduces a policy, county and city leaders would scramble for projects to build cities or industrial parks. The critical issue is how to draw up appropriate regional master plans for rational land use based on standards and requirements that accord with practical considerations. The Chinese government’s intention is to prevent the continuous expansion of large cities by launching a strategic plan to develop rural townships in order to strike a balance between large cities and small towns. Failure to take into proper consideration of, and going against, market forces would lead to wastage of resources. Indeed, such wastages have already appeared in Guizhou in the form of excess supply of industrial parks and premises that undermines their competitiveness (柴洪辉等/Chai Honghui *et al.*, 2009; 龙海波/Long Haibo, 2014). It is inevitable that these industrial parks would have to make adjustments accordingly in order to respond to real market demands and to face future challenges.

Up to 2013, rural migration has enabled 240 million people or 17 per cent of the national population to move into the cities (黄勇等/Huang Yong *et al.*, 2014). The unfettered expansion of cities under the free play of the market economy may give rise to the polarization of urban communities. The process of urbanization should not overlook the role of the smaller towns and medium-sized cities. The development of small urban centres should also not be constrained by rigid rules and models. Research by Chai Honghui and his co-workers in 2009 argued for the need for an “internal equilibrium” strategy by which urbanization should proceed in relation with specific circumstances including the market mechanism, in accordance with the characteristics of the locality, and in compliance with the socially just and planning principles stipulated by the state.

Many peasants and their children from the karst mountainous areas of Guizhou will join the ranks of the urban communities especially in the large cities. Those who remain will see progressive changes as agriculture moves towards modernization, specialization, larger-scale

production, automation and centralized operations. This scenario will take time to materialize as inherent environmental constraints and economic backwardness require massive efforts to overcome. The new peasants of Guizhou of the near future will be well-educated with access to a stable livelihood. Their standards of living will range from reasonably well-off to well-to-do and will enjoy a new community life which integrates their profession with a well-protected natural environment.

Notes

- 1 The prickly-ash in China is also known as Sichuan peppercorn which belongs to different species from the *Zanthoxylum* genus such as *Z. simulans* and *Z. piperitum*. It is often used as a spice in Chinese culinary. With a unique aroma and flavour, it has slight lemony overtones and creates a tingly numbness in the mouth.
- 2 PPE stands for poverty, population and environment. Poor peasants, for basic survival and due to their ignorance of the environmental problems, have excessively exploited the natural resources, resulting in environmental degradation.
- 3 One *mu* (亩) is equivalent to 1/15 hectare or about 667m².
- 4 *Sannong* refers to the three agriculture-related elements in China: rural villages, agriculture, and peasants.

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